POPULAR Computing WEEKLY

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This Week

Micro-Professor review

John Scriven puts the MPF II through its paces and looks at the accompanying disc drives and printer. See page 14

Spectrum calculator

Ian Logan looks at the advantages of using the calculator in the last of his present series on the Spectrum. See page 20

BBC assembler

Jeremy Ruston presents an introduction to the intricacies of assembly language programming on page 27.

New releases

Latest software games including *Escape from Perilous* for Atari and *Skier 64* for Commodore 64. See page 45

STAR GAME

Beltmen on 16K Spectrum. See page 10.

News Desk

Microdrive arriving soon

First deliveries of ZX Micro drives should take place in early September — with orders being taken in August.

With the launch date of the Sinclair ZX Microdrive and ZX Interface 1 (previously called the ZX Expansion Module) fast approaching more details are now beginning to emerge.

The ZX Interface 1 takes the form of a wedge-shaped box, the same size as the Spectrum, which sits underneath the computer tilting the keyboard up at an angle of about 20°. The box plugs into the expansion port and screws into the Spectrum ensuring a secure connection.

The design of the interface unit will make it difficult to use with Spectrums that are either inside a full-size keyboard case or connected to Micronet 800 using the Prism direct connect Prestel modem.

The ZX Interface 1 gives the Spectrum an RS232 communication port, a simple networking facility and the means to connect up to the long awaited ZX Microdrive mass-storage devices — all controlled by an 8K Rom.

Continued on page 5

The tax man cometh

THE Inland Revenue has set up a special team to investigate the microcomputer industry.

The IR is apparently worried about the large number of new companies that have sprung up in the last couple of years that are failing to fulfil their tax obligations.

In particular, as both hardware and software prices start to tumble there is concern that the bubble will burst and that no tax will be collected from the firms which go bankrupt or disappear.

Based in Bristol, the Special Office is currently screening and cross-indexing information from computer magazines published in the last 18 months.

Intelligence is being collated, not only from advertisements but also from interviews with individuals in an industry noted for its extravagant sales and motor car purchase

Continued on page 5

Classified

Continued on page 40


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All submissions should be typed and a double space should be left between each line Please leave wide margins

Programs should whenever possible be computer printed

We cannot guarantee to return every submitted article or program so please keep a copy If you want to have your program returned you must include a stamped addressed envelope

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs although we will always try our

This Week

Editorial

Sir Clive Sinclair's £2m research institute — Metalab — is an intriguing idea (*PCW* 2-8 June) Gather the brightest young minds in the country under one roof, pay them large salaries, give them unrivalled resources and take the resulting products through to the market-place

The idea is not new, of course American companies have been pursuing similar policies for years In Britain, however, the tendency has been to underpay researchers, limit their resources and give the end-product to someone else to market The realms of academia and business have, on the whole, been kept completely separate

The catch-phrase "British brains, American gains" has a kernel of truth, though it rather denigrates the innovative efforts of our American cousins

Metalab is designed to give researchers the freedom to pursue their own lines of investigation and the incentive to make the end-result into a commercial success It should provide the same sort of interface between science and business as the science parks, but without their attendant problems

Whether or not Metalab will be a success remains to be seen Certainly, Sir Clive is the man with the Midas touch at the moment The idea deservse to succeed, if only because it is an investment in the future

Next Thursday

Move the snake around the maze, eating the pounds and diamonds to grow bigger, but avoid the deadly dollars! Money Snake, next week's game for the unexpanded Vic20 by Ian Craighill.


WINDOW ON ANOTHER WORLD
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Gridrunner is an arcade game requiring one joystick.
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Microdrive

Continued from page 1

led by an 8K Rom

The Microdrives themselves are as predicted, high-speed tape drives Each unit measures 8 × 9 × 5cm and is roughly the same in appearance as the prototype shown at the time of the Spectrum's launch 15 months ago — the only main difference being a slot to take the tape 'cartridges' Each tape cartridge measures 30mm × 43mm × 5mm and has a nominal memory storage capacity of 100K. The tape inside the cartridge — a high-quality video type of width 1 5mm — is in a continuous loop 5 3 metres in length, rotating at about 1 3 metres per second

Access time to the tape is around 3 5 seconds and the information transfer rate to the computer is 16K per second Often it will take longer to find a program than to load it

Up to eight Microdrives can be connected — each one connecting into the last Each one uses up about 600 bytes of user Ram in the Spectrum and this may mean that some commercial cassette software will not Run with the Microdrive connected

A demonstration tape cartridge is to be supplied with the Microdrive

Prices have yet to be announced but the ZX Interface 1 is expected to cost around £30 with the ZX Microdrive at £40 Tape cartridges for the drive are expected at under £3 each

● One reason that the ZX Interface 1 provides a simple networking facility is that Spectrums may be used for terminals in a networking system driven by the next generation of Sinclair computers

25 commands for Spectrum

FIFTH is a software package adding 25 new Basic commands to the Sinclair Spectrum

According to Clement Chambers of Computer Rentals who will release the title in about six weeks *Fifth* is designed specifically for writing games on the Spectrum "You will no longer have to resort to machine code to write an arcade-type game *Fifth* will make writing a *Space Invader* game for example like falling off a log

Fifth is basically a sprite handling system Characters can be defined in shape and colour and then moved — retaining their shape and colour attributes

Each of the 25 keywords is entered into the Spectrum following a *Rem* statement In this way none of the existing Sinclair Basic commands are affected

Object is the command to define a shape within a single character square *Vector* sets its direction of travel in one of 16 options *Speed* sets its speed — with up to 155 variations *Move* followed by an x–y co-ordinate moves a given object to any point on the screen

Other commands are *Get Put Replace* (changes an object's colour) *Large* (magnifies an object in width or height), *Limit* (sets boundaries of an object's motion), *Attr* (detects a collision between any two given objects) and *Interact* (a conditional command giving new instructions following a collision)

Multi-statement lines are possible making more than one object move with the same command

Fifth is expected to cost around £10 and each tape will be accompanied by a 48K demonstration tape and a 25 page manual

More details from Computer Rentals Ltd, 140 Whitechapel Road London E1

New low-cost dotmatrix printer for the home

MANNESMANN Tally better known for its printers for business systems, has now announced a new low-cost dot-matrix printer for the home user

The MT80 is an 80-characters per second, 9 × 7 bi-directional, dot-matrix machine capable of using either friction feed or tractor feed stationary up to 10ins in width

In normal use, it prints 80 columns (10 characters per inch), but double width and compressed text (16 7 characters per inch) are also possible Double printing gives bold letters A unique feature is that the MT80's print head produces square rather than the more usual round dots, increasing legibility

The unit is available now, complete with parallel Centronics interface, price around £328 An alternative version adds a serial RS232 interface and 2K printer buffer for around another £58

Further information from Mannesmann Tally Molly Millars Lane, Wokingham Berks

● Epson, Mannesmann Tally's main rival also has a new printer — the RX80F/T A development of the existing RX80, the new model offers both friction and tractor feed The RX80F/T will cost £343

Taxman cometh

Continued from page 1

claims

Tony Slater of the Bristol Special Office said "I am interested in finding out as much as I can about the home computer business — hardware and software — from the top to the bottom

"It is too early to say what the results of the survey are — but I wouldn't say anything to you anyway"

The investigation seems to be developing in the same way as the extremely successful "Entertainers Unit" set up in Watford three years ago to combat tax evasion in the pop music industry

Alan Lamb, tax manager for London chartered accountants Crossley and Davis who act for one major home computer client commented "Anyone who sits back and hopes that the tax man will go away is wasting valuable time Computer software comes into a tricky area of taxation concerning 'intellectual property' One idiosyncrasy means that a best-selling piece of software is worthless at the point of its creation At that time there are possibilities for ensuring that the potentially valuable property achieves maximum profitability with the minimum of tax liabilities

QS goes transatlantic



Rod Cousins

QUICKSILVA has become one of the first UK software houses to open up an American office

The new company Quicksilva Inc, will be based in San Antonio, Texas

Rod Cousins, managing director of the UK company said, 'The new company will address the vast potential market for our software in the US and Canada and will also handle increasing demand from Latin America ' Quicksilva Inc will be responsible both for manufacture and distribution of software – particularly the Timex Sinclair 2000

Carl Ziegler until now general manager of Saab Fairchild SNC has been selected as president of Quicksilva Inc

Copy-cat 1

Regarding the correspondence on copying surely the whole point of this argument is that if a cassette has been produced in such a way that you cannot *Load* it and then recopy to another cassette then the supplier of that tape obviously did not want you to copy it! The case is simple Copyright belongs to the author or publisher Copyright means that the contents of a program *belongs* to one person — it is not public property

Copying cassettes" are obviously designed to copy tapes that one would normally be unable to copy They are therefore illegal No one would buy a copying program to copy another tape that they could copy without it would they? Suppliers of these tapes cannot be so naive as to believe they are acting in ignorance of what their produce is being used for I have yet to buy software that contained only one copy of a program on it You are usually supplied with back-up

As far as I can see, people buy copying programs to make *more than one* copy Mr Bobker's argument about software houses copying their own material is obvious rubbish They hold the copyright on that material and as such are able to do with it exactly as they like

Personally I am disappointed that your publication accepts these advertisements They can be nothing other than an invitation to break the law

David Penny
4 Victoria Terrace
Llansantffraid
Powys SY22 6AB

Chip in action

Have you ever wondered what a silicon chip in action must look like if we could see its electronic activities? This machine-code/Basic hybrid program may give some insight for Spectrum owners It works on any Spectrum

```
10 CLEAR 2999 INK 7 PAPER 0
   BRIGHT 1 BORDER 0 CLS
20 FOR x 30000 TO 30020 READ
   y POKE x y NEXT x
30 DATA 33 255 63 17 0 88 1 0
   24 58 174 16 38 19 11 138
   177 32 246 24 235
40 CIRCLE 128 88 87 RANDOMIZE
   FOR 30000
```

Sit back and watch Interesting, isn't it?

Iain Stewart
17 Torry Drive
Alva
Scotland FK12 5NQ

Copy-cat 2

We are suppliers of the Spectrum *Kopykat* program copies and would welcome the opportunity of replying to Andrew Ratter's letter in your issue of June 16

We would like to make it clear that it is *not* illegal to copy programs It is probably illegal to copy programs and then sell or give away such copies There has not so far been a test case in the courts to clarify this point It is reasonable to assume that when finally settled it will be decided that computer software is an intellectual property that may be copyright in the same way that a book, film or piece of music may be

It is definitely legal to make back up copies of any programs you own With business software the supplier often advises the user to do just this This is analogous to photocopying part of a library book for your own use or videotaping a film off the tv These practices are quite legal, but it is illegal to distribute copies whether for sale or for fee

It is not true to say that programs like the Spectrum *Kopykat* are used only to copy commercial software Our program for instance Runs continuously and enables every program or data-file on a tape to be copied without the difficulties of *Loading* and *Saving* each program individually This means that you can run through a whole tape of your own programs and produce a copy of the complete tape for a friend very easily

To call for the banning of such programs is ridiculous and rather like calling for the banning of photocopiers and videotape recorders In fact those tape recorders with two cassette drives that enable tape-to-tape copying are responsible for far more copies of programs than all copier programs put together, not to mention the copying of music tapes Should these be banned?

Finally, we would note that other suppliers of these programs are remarkably coy about the size of program that may be copied Our program enables full size of programs (over 41.5K) to be copied, which is certainly not true of some other programs on the market

We, of course, give full permission to all purchasers of the Spectrum *Kopykat* to make back up copies of it for their own use

J E Barker
Medsoft
61 Ardeen Road
Doncaster
South Yorkshire DN2 5ER

Copy-cat 3

The controversy about Copy-cat programs has been thoroughly debated in public, thanks to the generous amount of space allowed in your magazine

However I do feel that most of your correspondents are missing the point in suggesting the main use of these programs is illegal copying Those who wish to be so unethical need not even buy a Copy-cat cassette, for duplicates can easily be made by tape-to-tape and I cannot really understand why David Webb (Letters, July 7 13) should have had problems

In my opinion, most computer addicts (it really is an addiction) want to break into unstoppable programs for two reasons (a) a genuine desire to learn from the experts and (b) capability to modify the original program to suit their own special needs

Is it a sin to seek knowledge and thus improve one's own programming techniques, or to alter one's own property — we did buy the original cassettes after all — to put on it our own stamp of individuality?

If I buy a radio and can find a way of getting into the case, I am entitled to study the wiring circuit make modifications add components and even remove some to use in other electronic hook ups for my own use All this would be perfectly legal until I attempted to sell the ideas or components as my own invention

Stealing another's brains for personal gain is of course unlawful and totally wrong

Jack Bettridge
3 Ingleby Way
Wallington
Surrey

A moot point. Copy-cat programs have numerous supporters and detractors, both convinced that the other side is wrong.

The legal position is, as with most cases dealing with computers, unclear.

Copy-cat 4

I am writing to give my wholehearted support to Mr Webb (Letters 7-13 July) His suggestion about the replacement of damaged cassettes was a very sensible one and well worth taking up — I hope that software houses take heed

The adverse effects of home taping are something that I have often attempted to explain (with little success) to my associates and friends who have a "software swapping circle" and tape and exchange programs One person I know has spent £20-£30 yet has £200 worth of software

I believe that this is a growing problem, not helped by the availability of Copy-cat programs However, the damage has already been done These programs have already been sold in large quantities (and been copied in even greater quantities) and will be used

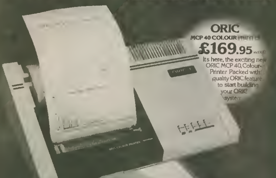
The only lasting solution that I can see is the use of Eproms which will eradicate home taping, and tough legislation to stop any professional copiers I realise that this will increase the cost of software, but surely if software is all saved on Eprom the cost of manufacturing cartridges will drop considerably

P Butcher
Highlands
Lyme Road
Crewkerne
Somerset TA18 8HF

Unfortunately, although Eproms are harder to copy than tapes, they are not copyproof

Legislation is needed to curb hat professional pirates, but for home-copiers it is more a matter of education

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A game for 16K or 48K Spectrum by T Wiley

As an electrician in the Clyde Syntax widget factory, it is your job to check the fuses at the top of each workshop. To reach the fuses, however, you must climb up the moving conveyor belts and through the holes in them, using the cursor keys 5 to 8.

Normally, the belts will slide along underneath you, but if a hole passes by you will fall down to the next level. Spread around the room are boxes you can stand on to prevent this happening. Once you reach the top, you must jump up to one of the numbered fuses — they are worth from 10 to 300 bonus points from left to right.

When you have checked one room's fuses, you must check the next room, where the belts are not only tattier (more holes) but move faster. If you take too long climbing the belts, the fuses will blow (at time — 0), and the game will end.

There are three sections of machine code to enter — type in the following:

```
1 REM (75 x s)
2 REM (30 x s)
3 INPUT A,B: FOR N=A TO B: INPUT (N);" ";X: POKE N,X: PRINT N,X: NEXT N
```

Run it three times with the following INPUT data:

(i) 23760, 23788, then the numbers in Fig 1
(ii) 23800, 23826, then Fig 2
(iii) 23846, 23845, then Fig 3

Save the three lines of program before you test it thus:

```
PLOT 128,0: DRAW 0,175: LET N=USR 23848
```

If the vertical line is broken into equal parts, with two rows of bits either side of it, the code is OK, and the rest of the program from line three onwards can be entered. Lines 20, 45 and 75 use Graphics "A" and lines 46 and 76 use Graphics "B". ■

```
   1 REM #VAL \E2VAL \ RESTORE M
OVE #??? GO SUB VAL  VALXXXXXXX
Y#VAL \E2VAL \ RESTORE MOVE +^??
 GO SUB LN  VAL \<>XXXXXXXXXXXXX
   2 REM >?G PRINT STEP DRAW \ L
ET ANDG PRINT STEP CLOSE #\ LET
ANDRETURN PI>=? FOR ?xx
   3 REM left 23760 right 23800
   4 GO SUB 600  LET sc=0
   5 PAPER 5  BORDER 5  INK 0  C
LS
   6 GO SUB 1000
   7 FOR a=0 TO 31  PRINT AT 0,a
,(a-INT (a/10)*10),"    NEXT a
  10 LET r=21  LET c=1
  11 DATA 0,16,80,60,18,16,40,32
  12 DATA 0,16,16,60,80,16,40,8
  13 DATA 0,16,80,60,18,16,40,3?
  18 LET q=0
  20 PRINT AT 21,1,"*
  25 FOR t=1000 TO 0 STEP -2
  29 PRINT #0,AT 1,0,"Score>=",s
c   ",TAB 13,"Time>=",t,"
  30 LET n=(INKEY$="8")-(INKEY$=
5")
  40 IF c+n>30 OR c+n<1 THEN GO
TO 60
  43 IF n=0 THEN GO TO 60
  44 LET q=NOT q
  45 PRINT AT r,c, OVER 1,"*"
  46 PRINT AT r,c+n, OVER 1,"*"
  60 LET c=c+n
  68 LET m=(INKEY$="8")-(INKEY$=
"")
  70 IF r+m>21 OR r+m<0 THEN GO
TO 100
  72 IF POINT (c*8+2,175-r*8) AN
D m=-1 THEN GO TO 100
  73 IF m=0 THEN GO TO 100
  74 LET q=NOT q
  75 PRINT AT r,c, OVER 1,"*"
  76 PRINT AT r+m,c, OVER 1,"*"
  77 LET sc=sc-10*(m)
  80 LET r=r+a
  90 IF r=0 THEN LET sc=sc+10*c
 GO TO 2000
 100 FOR g=0 TO 30-sc/80  NEXT g
 101 IF INKEY$<>"" THEN BEEP .01
,21-r
 300 LET l=USR 23840
 302 POKE 23675,w+q*8
 303 IF SCREEN$ (r+1,c)=" " THEN
 LET m=1  GO TO 74
 305 NEXT t
 306 GO TO 3000
 600 FOR k=USR "a" TO USR "d"-1
 READ a  POKE k,a  NEXT k
 630 LET w=PEEK 23675
 660 RETURN
1000 REM initialise
1002 OVER 0
1005 LET l=1
1007 PRINT #0,AT 0,0, INK 5,"--
--------------------------------"
1010 FOR c=7 TO 189 STEP 8
1011 LET l=NOT l  IF l THEN GO T
O 1020
1015 PLOT 0,c  DRAW 0,8,PI
1016 PLOT 255,c  DRAW 0,8,-PI
1020 PLOT 0,c  DRAW 255,0
1021 FOR d=1 TO 2+sc/500
1023 PRINT AT 21-INT (c/8),RND*2
9+1,"  NEXT d
1027 NEXT c
1029 OVER 1  PAPER 6
1030 FOR k=1 TO 21 STEP 2  PRINT
 AT k,0  PAPER 6
                    NEXT k
1050 FOR k=0 TO 10  PRINT AT RND
*20+1,RND*29+1,"#   NEXT k
1070 RETURN
2000 FLASH 1  PAPER 4  CLS
2020 PRINT AT 10,8,"BONUS ",c*10
  POINTS
2050 FOR c=1 TO 20  BEEP .01,21
 BEEP .01,26  BEEP .03,.31  NEXT
 c  FLASH 0  GO TO 5
3000 PAPER 0  INK 7  BORDER 0  C
LS
3010 OVER 0  PRINT AT 15,0,"oop
" the lights have gone out,
3020 PRINT AT 17,0,"Never mind-
you got ",sc," points."
3030 INPUT "Try again? ",y$  IF
y$="y" OR y$="Y" THEN RUN
5000 FOR c=0 TO 7777  LET l=l+(I
NKEY$<>"")  PRINT AT 0,0,l  NEXT
 c
```

Fig 1

23760	42
23761	178
23762	92
23763	69
23764	14
23765	0
23766	205
23767	170
23768	34
23769	128
23770	80
23771	176
23772	92
23773	229
23774	209
23775	35
23776	1
23777	31
23778	0
23779	237
23780	176
23781	80
23782	176
23783	92
23784	18
23785	0
23786	201

Fig 2

23800	42
23801	176
23802	92
23803	59
23804	14
23805	255
23806	205
23807	170
23808	34
23809	126
23810	50
23811	176
23812	92
23813	229
23814	209
23815	43
23816	1
23817	31
23818	8
23819	237
23820	184
23821	58
23822	176
23823	92
23824	18
23825	0
23826	201

Fig 3

23846	62
23847	7
23848	71
23849	245
23850	205
23851	252
23852	92
23853	241
23854	198
23855	8
23856	71
23857	245
23858	205
23859	212
23860	92
23861	241
23862	198
23863	8
23864	254
23865	167
23866	280
23867	24
23868	235



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On the screen . . .

David Kelly talks to Lawson Brown about the BBC's plans to broadcast software

Viewdata systems like Prestel which use telephone lines to communicate information are nothing new Neither are teletext systems like Ceefax and Oracle which are broadcast information services run respectively by the BBC and ITV

Using similar methods to transmit software programs is a more recent innovation

Micronet 800 launched in March this year became the first consumer software database to operate over the telephone network — using part of the Prestel facility

Now the BBC is to launch the world's first broadcast telesoftware service The scheme will run under the Ceefax umbrella and a former teacher — Lawson Brown — has been selected to co ordinate the project He explains "BBC telesoftware will be allocated five Ceefax pages on which we will broadcast computer software each with around 30 sub-pages

Between September 1980 and July 1982 the BBC carried out trials in conjunction with ITV Brighton Polytechnic and chip manufacturer Mullard to develop a workable system The results of that research persuaded the BBC to press forward and launch a full service planned to coincide with the start of the 1983/84 school year

In order to understand how telesoftware will work it is necessary to know a bit more about Ceefax itself The UK's PAL colour television system operates on 625 lines — but not all the lines are used for the picture If you switch on your television and squash down the picture using the height control you will be able to see four rows of white dots at the top of the picture This is the information — broadcast as a bit-string — which is decoded to give the Ceefax pages To read the pages you need a decoder Normally this means a special television with a built-in decoder

Pages are transmitted in an endless loop — if you want a particular page you have to wait until it comes round At the moment Ceefax has about a 15 second cycle (access) time Each page can support sub pages — up to 99 — and only one sub page is read on each cycle Subsequent sub-pages are read on subsequent cycles again in a loop returning to the first sub page after the last

In September to link up with the start of the BBC's telesoftware broadcasts, there will be an alternative way of decoding Ceefax pages — using an ordinary tv together with a BBC microcomputer and a special teletext adapter unit developed by Acorn

Says Lawson Brown "Because the information is coded for transmission in digital form it makes sense for a computer to be used in conjunction with it So originally when the BBC machine was first conceived as part of the BBC's Computer Literacy Project it was always envisaged as being capable of receiving broadcast software

Advantages of the Acorn system over a conventional teletext tv are that it is much faster it can save pages as they appear on screen to disc capture further pages while you are reading another, capture sub-pages as they go round allowing you to step through them at will It is also possible to write control software to enable the individual user to extract particular types or sets of information from the Ceefax pages

But the main application of the teletext adapter will be telesoftware Software down loaded from the BBC's telesoftware pages goes straight into the computer to be run or listed

To load a program, first the telesoft mode must be selected (the adapter has two modes — teletext and telesoft) Then it is necessary to type in the tv channel teletext page number and then *Exec* ' Name of program

The system takes about 15 seconds per K of program Every page incorporates what is called a cyclic redundancy check As the program is loading the computer calculates a value based on the Ascii codes of all the characters on the page being loaded At the end of the page the computer compares this value with one given on the end of the page — if the two numbers are different the computer signals a loading error and automatically reloads the page

Now that the system works, what is the BBC going to do with it? "Well, to start with, says Lawson, "we will only be broadcasting software for the BBC computer — simply because it is the only one at the moment with a teletext adapter If they are brought out for other machines then in theory we can transmit for them — the software at our end should work with any machine

This software is what Lawson calls the Sausage Machine — a software program developed by the BBC to encode programs into a form suitable for broadcasting It takes an ordinary file — in tokenised Basic — and turns it into an Ascii file which is what Ceefax demands Then it splits it up into Ceefax pages

The sausage machine also gives each Ceefax page a couple of identifying lines telling the receiving computer how many pages the program takes up which page the computer is reading what machine it is for redefinitions of active control codes and a run inhibit control If this last instruction is missed off then the program will auto-run on loading

"There is no security in the system at present says Lawson "because the whole idea is that telesoftware should be provided as a public service



The software Lawson will select will broadly be aimed at two areas — education and programs for the domestic user Educational material will probably dominate but Lawson is keen to emphasise that he means 'education in its broadest sense Many of the initial educational programs will be provided by either the MEP or by the Brighton Polytechnic project Lawson is also currently negotiating with other suppliers — including the Advisory Unit for Computer Based Education in Hatfield

'We are wide open to good quality software written by members of the public at the moment he says 'but if anyone does send anything it must be in machine-readable form together with full documentation and we are insisting that the programs must be of the highest standard because users can list them out and will use them to learn from Any program must for example be in good structured programming style Unfortunately the BBC will only pay a nominal £5 fee ' We will also have reviews of commercial software packages in cut-down sampler versions You will even be able to interact with some of the review versions I think that will form an important part of what we do because people are getting fed up shelling out quite large sums of money to buy software they have never seen

The initial software program schedule is now sorted out — and it will be published in the telesoftware index That can be found on Ceefax page 700 with more details of the programs and forthcoming attractions on page 701 Programs will be changed every two weeks and repeated once after three months

At the moment there are only two programs in the system but come September there should be a lot more And by then hopefully Acorn's manufacture of the teletext adapters will be in full swing Already, Acorn has received over 3,000 orders, without placing a single advertisement

Delivery of the first adapters is now planned for late August but because of the order back log that has built-up it seems unlikely that anyone ordering their £225 adapter now could hope to take delivery of it before late September ■

A strange animal !

***John Scriven** takes a look at the Multitech MPF II*

The Micro Professor MPF II is a strange animal. At £269 one would expect something fairly impressive both in looks and in performance. When released in the States two years ago, there was nothing in its price range, but now it has to compete with the likes of the BBC Micro and the Commodore 64.

In appearance, the MPF II is compact — smaller than a piece of A4 paper (eg, the size of this magazine) and only just over an inch in thickness. There are 49 tiny calculator keys recessed on the top, and a full range of interfaces.

At the back are sockets for standard PAL TV, a "monitor" (although it's a standard TV socket), and miniature jack sockets to connect a cassette recorder. Also to be found here is the low-voltage input (a separate power supply generates the rather unusual 5v and 9v necessary). On the side can be found the "real" keyboard/joystick socket, the printerface and the I/O port for disc-drives and cartridges.

You are also supplied with a two-way adaptor for the video output so the computer can be permanently connected to the TV. The usual white foam packaging also contains a diagnostic cassette and four manuals — one to install the machine correctly, a diagnostic booklet to complement the cassette, and two information books. One is a teaching manual and the other explains in some detail the more advanced features of the MPF II.

As an example of modern technological design, it is compact and neat and its internal construction is well laid-out, containing a sizeable speaker and two circuit-boards. The second of these is a colour card that piggy-backs the width of the case. The machine certainly has a feel of being well-made, but the calculator keys mean that anyone would plump immediately for the extension keyboard. This is full-size, containing a normal space-bar and two SHIFT keys as well as CONTROL, RESET and FIRE buttons.

The first criticism must be levelled at the keyboard. Instead of producing a traditional typewriter form, Multitech have gone for a rubber-pad model, presumably for cheapness. Unfortunately, the result is rather like upgrading a ZX81 with a Spectrum keyboard. Most people would rather pay £45 for the feel of real keys under their fingers than £30 to wade in a sea of floppy rubber.

As it is, touch typing is out of the question, and the space-bar fails to operate unless it is struck at either side. Another problem is that the *Fire* buttons are at the lower corners, in exactly the position that SHIFT usually occupies.

The machine itself has an impressive specification — 64K Ram (although it's really only 35K — 40K for most applications) and the ubiquitous 6502 as central processor. The character set is only upper-case, which is another reason why word-processing would be complicated, and as seems usual for machines full of Eastern promise, it omits the pound sign.

The Basic is practically identical to Applesoft, so much so that Applesoft programs can be loaded in from tape. This may lead you to suppose that you could equip yourself with an Apple for half the price — the problem is that nobody I know with an Apple still uses cassettes, and most software houses stopped producing tapes at least four years ago, when Apple released their disc-drives.

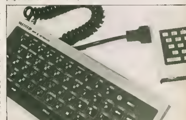
The importers have assured me that when Multitech drives arrive in this country they will be fully compatible with Apple format. As the drive units never appeared I wasn't able to test this out.

For those of you used to more recent Basics, Applesoft is a bit long in the tooth and makes no concessions to the structured programming lobby — no *Else*, *Repeat*, *While*, *Case* or *Procs* to be found. There are eight colours available, as opposed to 16 on the Apple II: black, green, purple, white, green, orange and blue. (Yes, I know there are only six different ones, but that's what the manual tells you!)

You also have the choice of two graphics modes. These are capable of reasonable graphics, and the commands *Plot*, *Hplot*, *Hlin* and *Vlin* provide easy ways of screen manipulation. If you want filled boxes or circles, etc, then you will have to resort to basic trig to plot them.

The drawing commands themselves are pretty good. Typing *Gr* will bring you into the low resolution graphics mode with an area of 40 by 40 pixels. *Hgr* produces the high-resolution mode — an area of 280 by 160 pixels. These two modes leave a space of four lines at the bottom of the screen for text. If *Hgr2* is selected, the screen is extended to 280 by 192 pixels with no room for text.

As with the Apple, it is possible to define a wide range of graphics in shape tables and move them around the screen, rotating and changing the size with ease — this can result in good graphics, but the slowness of the Basic lets it down. Potential





games writers will have to take their 6502 primers to bed with them!

As an extra, there are on-board graphics symbols rather more like the PET shapes than those found on Sinclair machines. Another similarity to Spectrums and ZX81s is the option to have single-key entry if you so desire. This is achieved by holding down SHIFT and CONTROL while depressing a letter key. The key-words are written above the keys on the large keyboard and available on a plastic overlay on the standard machine.

The manuals are very comprehensive and full of sample programs. Unfortunately they are translated from Chinese and the inevitable few mistakes have crept in. There is no index in the Basic tutorial manual, which is frustrating, and the explanations of graphics commands are not as clear as they could be.

Access to the sound commands seems to be by trial and error. It is as unfriendly as the Vic20, relying as it does on *Pokes* for success. While the results approach the standard of the Oric they are nowhere near as easy to produce, and assistance in the manual is sadly lacking.

On the whole, I would suggest that anyone buying an MPF II would do well to get their hands on an Apple manual. The differences in Basic commands are minimal, and the American authors have produced a clear and concise guide that contains most of what you would need. They are also amusing in a dry way.

The MPF II books are full of cartoons that don't help to explain points in the text and the only real humour is in the misprints!

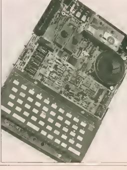
The printer, supplied as an extra, uses heat sensitive paper and makes use of the excellent screen dump command to produce graphs, etc, from the display, as well as normal *Lprinting* and *Llisting*. The characters are 5 × 7 pixels on a matrix of 7 × 10 and are standard size on 4 1/2 inch paper.

The full ASCII character set is available as well as lower case and graphics. Bit image printing is possible, as used in hi-res screen dumps, and the printing speed is variable from 150 to 180 lines a minute.

The 68-page manual gives details on how to connect up the printer to other computers with a Centronics Interface. The cable to the MPF II, however, has a 16 socket connector that is specific to that machine, so using the printer with other computers is not as straightforward as it could be.

It cannot produce the print quality of daisy wheel printers or an Epson but it is ten times better than a Sinclair and at least as good as the dot-matrix printers around £250.

Six cassettes are available — *Gobbler*, a Pacman look alike, and some rather boring "educational" cassettes. The joystick cannot be used if the extension keyboard is plugged in, and is not very sensitive (it only has four rather than eight switches inside). The games tapes were equivalent to Commodore or Dragon versions but there was nothing that rivalled the Apple high-resolution games that should be possible on this computer.



This is where the problem lies. Apple games should be compatible (according to Multitech), but you would be poorly off if you relied on the software available at present.

For someone used to an Apple, there are few problems, but they would certainly miss the real keyboard and discs. Another problem is knowing who the MPF II is aimed at. The advertising would imply that this is a machine upon which to learn Basic, and yet it is based on the Apple, a machine which very few people would choose as a home computer.

If the likely customers are small businesses, then they would be disappointed in the lack of useful software. A lot seems to depend on the compatibility of the disc system, if and when it appears.

The facilities offered by the printer certainly improved my over all impressions of the MPF system, but it is still difficult to recommend it to potential purchasers. For a machine that appears so well made it is a pity that it falls between so many stools — it is graphically inferior to the BBC and Commodore 64 machines, although it offers more than Spectrums, etc.

If it had appeared two or three years ago, it would have been a good investment. Now it shows its age by using a five year old version of Basic. Ultimately it is let down by its tacky keyboard and a price that is about £100 more than it should be.

Thanks are due to Jay-Dee Computers of Port Talbot for their help in supplying the review machine. ■

Strong language!

***Bryan Skinnar** presents a program that is designed to help you learn French*

This article describes a program to aid the learning and spelling of words It is designed to be used to learn French vocabulary, but could easily be amended for use with a different language It could also be used for young children learning English

The program is written for the Dragon 32 micro but is easily adaptable for most other machines The major differences will be in the screen handling, random number generation and string manipulation

The user is initially presented with the first character of a word He may then either guess at the word, see the next letter or give up If the user guesses the word correctly a point is gained and the user given credit according to how many letters have been added the most credit being earned for the least additions

If the user quits the word is displayed before the next go And if all the letters have been added without the user guessing the word it is again displayed

The words are presented at random without any words being repeated At the end of the program, the user is shown how many words he guessed correctly

The words themselves are held in Data statements at the end of the program Should you alter these check if you need to alter the variable *Nw* at the beginning of the program Also check *Ng* since if you try to have more goes than words the subroutine which prevents reselection of words will never be resolved Of course, you could insert a routine to allow the user to select the number of goes given the above constraints

Perhaps the least comprehensible part of the coding lies in the calculation of the percentage score This I will leave to you to unravel

Figure 1 shows the variables and their meanings

Fig 1
PG — potential guesses
TL — total length of all words
GI — guessed in

Remember that you cannot make a guess without seeing at least the first character!

The program is fully documented and should therefore be easy to understand Lines 1120-1160 show how to manipulate *Data* statements easily *Restore* the data pointer to the first data item (line 130) calculate which data item you want call a subroutine to move the data pointer to the item you require (remembering that you should therefore move it *N*−*1* times! — see line 1130) then *Read* the item

Notice that this operation should not be done with a *For Next* loop The reason for this is that in most implementations of Basic such loops are always performed at least once, since checking the loop counter is done at the end of the loop In practice, this means that using a *For Next* loop to move the data pointer will prevent us ever accessing the first data item!

This technique is useful if you have so much data that there is not room to hold it in an array In this example, the program could be simplified by the use of an array by the following amendments

```
35 DIM WD$ (NW) REM ARRAY FOR WORDS
36 FOR W = 1 TO NW READ WD$(W) NEXT
```

Delete line 120
Delete lines 1120-1170
Amend line 200 to 200 AW$ = WD$(R)

Analysis of program

Lines	
10-110	Initialisation of initial variables
120-210	Select a word at random (no repeats)
220 240	Set variables
250 260	Set letter pointer to first character of word
270-310	Display the first *L* characters of word and print prompt
320	Clear prompt from screen
330-380	Action according to user's choice
330	Next letter — update letter pointer If last letter display it Update *GI* and terminate go
340	Quit — display word update *GI* & terminate go
200	Guess — do guess subroutine then terminate go
360	Update letter pointer If not end of word set next letter
370-400	End of go — display word print continue prompt, update goes and do next if necessary
410-490	End of program — display number of correct guesses, calculate % based on number of characters displayed before successful guesses print result & end
500-580	Guesses — define letters of the rest of the word set input & compare print appropriate message update *GI* (guessed in) and *CG* (correct guesses) if correct
600-620	Space to continue subroutine
1000-1030	Space to continue subround
1040-1110	Get a random number test if used before, if so get another
1120-1170	Move the data pointer to the random number chosen to point to the next word
2000-2020	*DATA* statements

```
10 REM **************** DEFINE VARIABLES ****************
20 NG=10
30 NW = 10:REM NUMBER OF WORDS
40 DIM RN(NG):REM ARRAY FOR RANDOM NUMBERS
50 CH$ = "GNQ":REM STRING TO SELECT CHOICE (SEE LINE    )
60 CG = 0:REM CORRECT GUESSES
70 GI = 0:REM VARIABLE FOR "GUESSED IN"
80 TL = 0:REM TOTAL LENGTH OF WORDS VARIABLE
90 REM ************** VARIABLES DEFINED ******************
100 G = 1:REM 1ST GO
110 REM £££££££££££££££££££££ START OF A GO ££££££££££££££
120 RESTORE:REM RESET DATA POINTER
130 CLS
140 PRINT@ L(2),"GO NUMBER";G
150 GOSUB 1040:REM GET RANDOM NUMBER *
160 REM                 TEST FOR REPEATS *
170 REM                  MOVE DATA POINTER TO WORD NUMBER R
180 RN(G) = R:REM PUT THE RANDOM NUMBER INTO THE ARRAY
190 REM
200 READ AW$:REM GET A WORD
210 LS = LEN(AW$):REM LENGTH OF WORD
220 TL = TL + LS:REM UPDATE TOTAL LENGTH OF WORDS
230 REM
240 REM ******* NOW DISPLAY CHARACTER BY CHARACTER *****
250 L = 1:REM L=CHARACTERS OF WORD
```

Continued on page 19

```
260 PRINT@ L(4),MID$(AW$,1,L):REM PRINT L CHARACTERS OF WORD
270 PRINT@ L(15),"G=GUESS/N=NEXT/Q=GIVE UP"
280 UC$ = INKEY$:IF UC$ = "" THEN 280
290 UC = INSTR(1,CH$,UC$)
300 IF UC = 0 THEN GOTO 280
310 PRINT@ L(15),STRING$(32,32);
320 IF UC = 2 THEN L=L+1:IF L = LS THEN GI=GI+LS-1:GOTO 360:
    REM NEXT LETTER,IF END OF WORD,PRINT IT
330 IF UC = 3 THEN GI = GI+LS-1:GOSUB 590:GOTO 370:REM QUIT-
    DISPLAY WORD & DO NEXT GO
340 IF UC = 1 THEN GOSUB 480:GOTO 370:REM GUESS SUBROUTINE,
    THEN NEXT GO
350 IF L <= LS THEN GOTO 260:GET NEXT LETTER, IF ANY
360 GOSUB 590:REM DISPLAY WORD
370 GOSUB 1000:REM SPACE TO CONTINUE
380 G = G + 1:REM UPDATE NUMBER OF GOES
390 IF G <= NG THEN GOTO 110:REM NEXT GO
400 REM %%%%%%%%%%%%%%% ALL GOES DONE %%%%%%%%%%%%%%%%%%%%%%%%%%
410 CLS
420 PRINT@ L(5),"YOU GOT";CG;" OUT OF";NG
430 FG = TL - NG:SC = 100 * (1 - (GI / FG) )
440 PRINT@ L(7),"PERCENTAGE SCORE=";SC;"%"
450 PRINT@ L(9),"END OF PROGRAM"
460 END
470 REM %%%%%%%%%%%%%%%%%%%%%% END OF PROGRAM %%%%%%%%%%%%%%%%%%%
480 REM ~~~~~~~~~~ SUBROUTINE FOR GUESSES ~~~~~~~~~~~~~~~~~~~
490 RO$ = RIGHT$(AW$,LS-L):REM REST [illegible]
500 PRINT@ L(7),"ENTER YOUR GUESS ";
510 INPUT GU$:REM GUESS
520 IF GU$ = RO$ THEN GOTO 550
530 GI=GI+LS-1
540 PRINT@ L(10),"WRONG":GOSUB 590:RETURN
550 PRINT@ L(10),"CORRECT":CG=CG+1
560 GI=GI+L-1
570 RETURN
580 REM ~~~~~~~~~~~~~~~~~~~ END OF GUESSES ~~~~~~~~~~~~~~~~~~~~~~
590 PRINT@ L(11),"THE WORD WAS ";AW$
600 RETURN
1000 PRINT@L(16),"PRESS SPACE TO CONTINUE";
1010 C$ = INKEY$:IF C$ <  CHR$(32) THEN GOTO 1010
1020 PRINT@ L(16),STRING$(31,32);
1030 RETURN
1040 REM GET A RANDOM NUMBER,TEST FOR REPEATS,MOVE DATA POINTER
1050 R = RND(10)
1060 EF = 0
1070 FOR CN = 1 TO G-1
1080 IF R = RN(CN) THEN EF = 1:REM ALREADY USED R
1090 NEXT
1100 IF EF = 1 THEN GOTO 1050
1110 REM ************** TEST COMPLETED *************
1120 REM ++++++++++ MOVE DATA POINTER ++++++++++++++
1130 RW = 1
1140 IF RW = R THEN RETURN
1150 READ AW$
1160 RW = RW +1:GOTO 1140
1170 REM ++++++++++++ POINTER MOVED ++++++++++++++++
1180 RETURN
1190  REM $$$$$$$$$$$$$$$$$$ DATA BLOCK $$$$$$$$$
2000 DATA MAISON,CHAMBRE,BLEU,ROUGE
2010 DATA PERE,MERE,GRENOUILLE,CHAT,CHIEN,SOEUR
```

Calculated actions

***Ian Logan** explains how to use the calculator in the last of his current series*

A microcomputer operating system has many parts. That part which contains all of the routines for handling arithmetic and manipulating strings can be called the calculator.

In the Spectrum there are a relatively small number of rules to be followed when using the calculator. Hence, it is easy for a machine code programmer to include 'calls to the calculator' in his, or her, own programs.

The calculator is called into use by a particular Z80 restart instruction — *Rst 0028h* — followed by defined bytes that indicate which routines are to be used. All the routines in the calculator have their own unique defined bytes, which makes for a very compact internal calculator language.

Now for the rules.

(i) *Look after the calculator stack correctly*

The main work area is the calculator stack. In this area the user can store 5-byte numbers or 5-byte string descriptors. The system variable *Stkbot* always points to the base address of this area, while the system variable *Stkend* always points to the first free location above the current stack. If this stack is empty, then these two system variables will hold the same address, otherwise *Stkend* will always point higher in memory than *Stkbot*.

The calculator stack is used in the standard "last-in, first-out" manner. It is undesirable though not normally fatal to either take a value off the stack when it is empty, or to leave unused values on the stack when moving on to the next part of a program. Remember that the calculator stack is totally separate from the Z80 machine stack and that 5 byte values are never stored on the machine stack in normal operation.

(ii) *Make use of the calculator's memory area*

There is a second work area used by the calculator and that is the memory area. It has 30 locations that form a sub area within the system variables area. In these locations it is possible to hold six 5-byte values in an ordered manner. These 5-byte slots can conveniently be labelled *'mem-0, mem-1, mem-2, mem-3, mem-4 and mem-5*.

The system variable *Mem* normally points to the base address of the memory area and hence forms a vector to the current memory area. Indeed, the machine

Table of Calculator Routines (adapted from The Complete Spectrum ROM Disassembly).

DEFB	LABEL	DEFB	LABEL	DEFB	LABEL	DEFB	LABEL
00	jump-true	15	str-less	2A	abs	86	series-06
01	exchange	16	strs-eql	2B	peek	88	series-08
02	delete	17	strs-add	2C	in	8C	series-0C
03	subtract	18	val$	2D	usr-no	A0	stk-zero
04	multiply	19	usr-$	2E	str$	A1	stk-one
05	division	1A	read-in	2F	chr$	A2	stk-half
06	to-power	1B	negate	30	not	A3	stk-pi/2
07	or	1C	code	31	duplicate	A4	stk-ten
08	no-&-no	1D	val	32	n-mod-m	C0	st-mem-0
09	no-l-eql	1E	len	33	jump	C1	st-mem-1
0A	no-gr-eq	1F	sin	34	stk-data	C2	st-mem-2
0B	nos-neql	20	cos	35	dec-jr-nz	C3	st-mem-3
0C	no-grtr	21	tan	36	less-0	C4	st-mem-4
0D	no-less	22	asn	37	greater-0	C5	st-mem-5
0E	nos-eql	23	acs	38	end-calc	E0	get-mem-0
0F	addition	24	atn	39	get-argt	E1	get-mem-1
10	str-&-no	25	ln	3A	truncate	E2	get-mem-2
11	str-l-eql	26	exp	3B	fp-calc-2	E3	get-mem-3
12	str-gr-eq	27	int	3C	e-to-fp	E4	get-mem-4
13	strs-neql	28	sqr	3D	re-stack	E5	get-mem-5
14	str-grtr	29	sgn				

All 'defined bytes' are given in hex.

code programmer is quite at liberty to move the memory area by altering the address in *Mem* if so wished

The calculator contains routines for handling the values in individual slots, which can be very useful when a value is to be held aside for a moment.

(iii) *If in doubt save H' and L'*

In the normal operation of the Spectrum, the alternative *H'l'* register pair contains the return address required after a *Usr* machine code routine has been executed. Although these registers are not normally disturbed it is good practice to store and later restore these particular registers if there should be any doubt

(iv) *Transferring values to the calculator stack*

There is a series of ways of putting values on the calculator stack and each has its own advantages and disadvantages

- *Integers in the range 0 – 255*
  These are best transferred by entering the value into the *A* register and calling the subroutine *STACK-A (2D28h)*
- *Integers in the range 0 – 65535*
  Enter the value into the *BC* register pair — high byte in *B* low byte in *C* and call *STACK-BC (2D2Bh)*
- *Strings*
  A string descriptor comprises five bytes. A two byte length a two byte starting address and a fifth 'unused' byte. Note that the string of characters can never itself be put on the calculator stack
  A string descriptor can be transferred by entering the length into the *BC* register pair the start into the *DE* register and calling *STK-Store (2AB6h)*
- *Transferring a number as a string*
  It is possible to transfer a number by putting the 5-bytes of the floating-point number into the appropriate registers and calling *STK-STORE (2AB6h)*. The *A* register has to hold the exponent and the *E D C* and *B* registers the four bytes of the mantissa

The action of transferring a value to the calculator stack adds one to the number of items on that stack. Values can be transferred to a memory area slot directly the correct base address being derived from the system variable *Mem*

(v) *Taking values off the calculator stack*

Again, there are a series of ways of taking numbers or strings off the calculator stack

- *Numbers whose integer value is 0 – 255*
  A call to the routine *FP-TO-A (2DD5h)* will compress the topmost value on the stack into the *A* register. The carry flag is returned reset if the value fits successfully
- *Numbers whose integer value is 0 – 65535*
  A call to the routine *FP-TO-BC (2DA2h)* compresses a value into the *BC* register pair. Again the carry flag shows overflow
  In both cases the zero flag is set for positive numbers and reset for negative numbers. Note that string descriptors do not tend to compress to sensible numbers!
- *Fetching string descriptors*
  A call to *STK-FETCH (2BF1h)* takes a 5 byte value off the stack. It puts the first byte into the *A* register (normally a zero) and the other bytes into the *E* and *D* registers (normally the starting address) and the *C* and *B* registers (normally the length of the string)
- *Printing a value as a decimal number*
  This action also takes a value off the stack. A call to *PRINT-FP (2DE3h)* leads to the topmost value being taken as a number and it is printed at the current print position

Calculator's routines

The full list of the 82 routines is given in the accompanying table. The most important

```
   1 REM -- a CUBE routine --
  10 INPUT "Enter your value ";a
  20 PRINT a;" cubed = ";
  30 LET VARS=1+PEEK 23627+256*P
EEK 23628
  40 LET MEM5=25+PEEK 23656+256*
PEEK 23657
  50 FOR n=0 TO 4
  60 POKE MEM5+n,PEEK (VARS+n)
  70 NEXT n
 100 POKE 32000,239  REM CALC
 110 POKE 32001,229  REM get
 120 POKE 32002,49  REM dup
 130 POKE 32003,49  REM dup
 140 POKE 32004,4  REM mult
 150 POKE 32005,4  REM mult
 160 POKE 32006,56  REM end
 170 POKE 32007,195  REM JP
 180 POKE 32008,227. REM print
 190 POKE 32009,45  REM fp
 200 RANDOMIZE USR 32000
 210 PRINT
 220 GO TO 10
```

routines are as follows

(i) *Stacking constants*

The calculator has a table of five constants all of which are very useful. They are *stk-zero (A0) stk-one (A1) stk-half (A2) stk pi/2 (A3)* and *stk-ten (A4)*. In each case the required constant is added to the calculator stack as a 5-byte number

(ii) *Arithmetic operators*

The main arithmetic operations are addition *(0F)* subtraction *(03)* multiplication *(04)* and division *(05)*. In each case the two topmost numbers on the calculator stack are replaced by a single result

(iii) *The numeric functions*

There are a large number of routines for handling functions, eg tan *(21)* ln *(25)*, sqr *(28)* etc. In all cases the topmost value is modified by the function — the stack remains unchanged in size

(iv) *Manipulating the stack*

There are four special routines that are very useful

- exchange (01) — the two topmost values are switched over
- delete (02) — the topmost value is lost
- duplicate (31) — the topmost value is repeated
- restack (3D) — the topmost value is converted to the long form if it is a short integer

(v) *Transferring values to the memory area*

The six defined bytes *C0 — C5* are all '*st mem-x*' instructions. This action merely copies the value to the required memory area slot. The stack is left unaffected

(vi) *Fetching values from the memory area*

The six defined bytes *E0 — E5* are all '*get-mem-x*' instructions. The instructions in this group transfer values to the calculator stack and the stack thereby increases in size

(vii) *Exiting from the calculator*

The *end-calc (38)* routine has to be called as the last routine whenever the calculator is used. This routine has no action other than to return the user to normal Z80 machine code

(viii) *Stacking 5-byte numbers*

The routine *stk-data (34)* is of special interest as it allows the user to stack numbers from within a series of defined bytes. Although a compressed form can be used it is probably easiest if the '34' is followed by the five bytes of the number with the exponent byte increased by *70h*

Using the calculator

The accompanying Basic program illustrates how the Spectrum's calculator can be used. The task of the program is to do no more than print the value obtained by 'cubing' the *Input* value. Of course in this instance the use of '*Print a*a*a*' would be easier but less instructive

The parts of the program are

Lines	
1	the title
10	the INPUT value for 'a' is requested
30-70	the 5-byte value of 'a' is moved to the slot mem-5 (The INPUT value is present in the variables area and needs to be passed to the calculator and this is a suitable manner for the present example.)
100-190	a machine code routine of ten bytes. The code of the area has been selected as 32000 (Just a suitable round number.)

The assembly list is

```
RST 0028 FP-CALC  invoke the calculator
DEFB E5 get mem-5 take the value 'a'
                  ;stack holds 'a'
DEFB 31 duplicate ;stack holds 'a' 'a'
DEFB 31 duplicate ;stack holds 'a' 'a' 'a'
DEFB 04 multiply  ;stack holds 'a' 'a*a'
DEFB 04 multiply  ;stack holds 'a*a*a'
DEFB 38 end-calc  exit from the calculator
                  leaving 'a*a*a' on the stack.
JP 2DE3 PRINT FP  exit from the machine code
                  routine via PRINT-FP so as
                  to print 'a*a*a'
```

200	execute the USR routine.
210	supply a line-feed
220	around once again

Note: Line 20 does use the memory area hence it is placed before the moving of the 'a' value

This example of how to use the calculator is just a starter and is not meant to do any more than introduce the subject. For more information refer to *Understanding Your Spectrum* or *The Complete Spectrum Rom Disassembly* published by Melbourne House

Save and load . . .

Brian Cedge *explains how to catalogue your tapes to screen or pnnter*

This article deals with the Dragon's cassette operating system and how it can be used to *Save* and *Load* programs from machine language. This will be useful for anyone writing programs like word processors which need to access the cassette recorder.

The cassette interface operates at about 1 500 baud (160 characters per second) and uses blocks of 256 bytes for *Loading* and *Saving*. The cassette buffer usually starts at address 474 in the system Ram but may easily be changed.

This program is designed to end hours of searching tapes with thousands of *Skipf* commands — it will catalogue the programs on your cassettes to either the screen or pnnter (if attached).

To enter the program either key in the assembly language listing directly (if you have an assembler) or enter and Run the Basic loader program. This program will check for errors in the *Data* statements — avoiding a machine crash.

To use the program type

? USR0(0) to get a screen output or
? USR0(1) to get a printer ouput

Any other number in the bracket will yield a syntax error message.

Place the cassette in the recorder as if to *Load* the program and press play. As programs are encountered, their file names will be displayed together with filetype (Basic data or machine code). For machine code programs the start and entry address of the program is also printed. Finally the block number is seen ticking over in hexadecimal — one block is 256 bytes of data.

The Rom routines are all given labels in lines 30-100 of the assembly language listing — look at the listing for actual entry addresses.

Location 126 contains the address of the start of the cassette buffer, which is set to 474 as normal in line 260. @search starts the cassette motor and looks for a header (126 bytes of hex 55). Control then goes to @getblock which *Loads* a block of data into the buffer.

Location 124 contains the block type — 1 is data, 0 is namefile, 255 is end of file. If this location contains a namefile, then the filename and filetype are printed to channel *@chan*. If machine code is involved the start and entry addresses are also printed. The rest of the blocks are skipped displaying the block number until an end of file is found. The program then loops and starts asearching for the next program.

@PRINT will print the character in register A to the channel in location 111
@NUMPRT will print the number in the D register to channel in location 111
@MOTOROFF will turn off the relay (Routine 48591 — not used here — will turn it on)

To *Save* data to tape, the best method is to access the *Csavem* command in the Rom. Follow this procedure:

Ld X Return address to your program
PSHS X
Ld X Start of data to be stored
St Xn487
PSHS X
Ld X, End of data
PSHS X
Ld X Entry address (use 48004 if not actual machine code)
ST X 485
PSHS X
JMP 39195

The Rom routine will then *Save* the data and return control to the first address pushed onto the stack. Similar routines can be accessed for *Loading* but @search and @getblock should be sufficent ■

```
10 CLEAR 200,32499
20 FOR I=1 TO 233:READA$ Z=VAL("&H"+A$):CS=CS+Z POKE I+32499,Z:NEXT
30 DATA BD,8D,27,C1,1,23,5,C6,2,7E,83,44,7C,0,68,7F,1,41,5D,27,5,86,FE,B7,1,41,B
D,8A,77,8E,1,DA,9F,7E,BD,8D,E7,BD,B9,3E,26,FB,B6,0,7C,26,F6,BD,BD,DC,B6,1,41,B7,
0,6F,8E,1,DA,A6
40 DATA 80 BD,B5,4A,8C,1,E2,25,F6,86,20,BD,B5,4A,B6,1,E2 BD,75,81,2,26,16,86,20,
BD,B5,4A,FC,1,E7,BD,95,7A,86,20,BD,B5 4A,FC,1,E5,BD,95,7A,86,20,BD,B5,4A,86,FF,2
1,8A,8,D7,FF,21,7F,1
50 DATA 40,BD,7F,92,BD,B9,3E,86,0,7C,81,FF,27,5,7C,1,40,28,EE,B6,1,41,B7,0,6F,7C
,0,89,7C,0 89 86,D,BD,B5,4A,20,84,B6,1,40,5F,84,F0,44,44,44,44,BD,9,5C,B6,1,40,8
4,F,6D,1,39,B1
60 DATA A,24,4,8B,70,20,2,8B,37,9E,98,30,85,A7,84,39,34,2,C6,5,3D,C3,7F,CE,1F,1,
C4,5,A6,80,8D,B5,4A,5A,26 FB,35,82 42,41,53,49,43,44 41 54 41,28,4D,43,4F,44,45
70 IF CS<>25363 THEN PRINT"DATA ERROR" STOP
80 DEF USR0=32500
```

```
7EF4                20      PRT
7EF4                30 @START EQU *
B54A                40 @PRINT EQU 46410
957A                50 @NUMPRT EQU 38266
BDE7                60 @SEARCH EQU 48615
B93E                70 @GETBLOCK EQU 47422
BDDC                80 @MOTOROFF EQU 48604
0140                90 @BLKS EQU 320
0141               100 @CHAN EQU 321
7EF4 BD8B27        200     JSR 35623
7EF7 C101          210     CMPB #1
7EF9 2305          210     BLS @OK
7EFB C602          220     LDB #2
7EFD 7E8344        220     JMP 33604
7F00 7C0068        230 @OK INC 104
7F03 7F0141        230     CLR @CHAN
7F06 5D            230     TSTB
7F07 2705          230     BEQ @SCR
7F09 86FE          240     LDA #254
7F0B B70141        240     STA @CHAN
7F0E BDBA77        250 @SCR JSR 47735
7F11 8E01DA        260     LDX #474
7F14 9F7E          260     STX >126
7F16 BDBDE7        270 @BEGIN JSR @SEARCH
7F19 BDB93E        280 @ERROR JSR @GETBLOCK
```

```
7F1C 26FB              290      BNE @ERROR
7F1E B6007C            300      LDA 124
7F21 26F6              300      BNE @ERROR
7F23 BD8DDC            310      JSR @MOTOROFF
7F26 B60141            320      LDA @CHAN
7F29 B7006F            320      STA 111
7F2C 8E01DA            330      LDX #474
7F2F A680              340 @NAM LDA ,X+
7F31 BD854A            340      JSR @PRINT
7F34 8C01E2            340      CMPX #474+8
7F37 25F6              340      BLO @NAM
7F39 8620              350      LDA #32
7F3B BD854A            350      JSR @PRINT
7F3E B601E2            360      LDA 474+8
7F41 8D75              360      BSR @TYPE
7F43 8102              370      CMPA #2
7F45 2616              370      BNE @CONT
7F47 8620              380      LDA #32
7F49 BD854A            380      JSR @PRINT
7F4C FC01E7            380      LDD 474+13
7F4F BD957A            380      JSR @NUMPRT
7F52 8620              390      LDA #32
7F54 BD854A            390      JSR @PRINT
7F57 FC01E5            400      LDD 474+11
7F5A BD957A            400      JSR @NUMPRT
7F5D 8620              410 @CONT LDA #32
7F5F BD854A            410      JSR @PRINT
7F62 B6FF21            420      LDA 65313
7F65 8A08              420      ORA #8
7F67 B7FF21            420      STA 65313
7F6A 7F0140            430      CLR @BLKS
7F6D BD7F92            440 @LOOP JSR @HEX
7F70 BD893E            450      JSR @GETBLOCK
7F73 B6007C            460      LDA 124
7F76 81FF              470      CMPA #255
7F78 2705              470      BEQ @FIN
7F7A 7C0140            480      INC @BLKS
7F7D 20EE              480      BRA @LOOP
7F7F B60141            490 @FIN LDA @CHAN
7F82 B7006F            490      STA 111
7F85 7C0089            490      INC 137
7F88 7C0089            490      INC 137
7F8B 860D              500      LDA #13
7F8D BD854A            500      JSR @PRINT
7F90 2084              500      BRA @BEGIN
7F92 B60140            510 @HEX LDA @BLKS
7F95 5F                510      CLRB
7F96 84F0              520      ANDA #240
7F98 44                520      LSRA
7F99 44                520      LSRA
7F9A 44                520      LSRA
7F9B 44                520      LSRA
7F9C 8D09              530      BSR @CHROUT
7F9E 5C                530      INCB
7F9F B60140            540      LDA @BLKS
7FA2 840F              540      ANDA #15
7FA4 8D01              540      BSR @CHROUT
7FA6 39                550      RTS
7FA7 810A              560 @CHROUT CMPA #10
7FA9 2404              560      BHS @ALPHA
7FAB 8B70              570      ADDA #112
7FAD 2002              570      BRA @PUT
7FAF 8B37              580 @ALPHA ADDA #55
7FB1 9E88              590 @PUT LDX >136
7FB3 3085              600      LEAX B,X
7FB5 A784              600      STA ,X
7FB7 39                600      RTS
7FB8 3402              610 @TYPE PSHS A
7FBA C605              610      LDB #5
7FBC 3D                610      MUL
7FBD C37FCE            620      ADDD #@TEXT
7FC0 1F01              630      TFR D,X
7FC2 C605              630      LDB #5
7FC4 A680              640 @TYP LDA ,X+
7FC6 BD854A            640      JSR @PRINT
7FC9 5A                650      DECB
7FCA 26F8              650      BNE @TYP
7FCC 3582              650      PULS A,PC
7FCE 4241534943444154  700 @TEXT FCC 'BASICDATA MCODE'
7FDD                  1000      END @START
```

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Assembled—part one

Jeremy Ruston provides a simple introduction to the intricacies of assembly language

Many BBC micro programmers restrict themselves to programming in BBC Basic This is not a bad idea, since there are advantages to programming in Basic — programming can generally be done quite quickly easily and with less chance of things not working when you try to run the program Just as importantly Basic is an easy language to debug

Once programmers begin to realise the disadvantages of Basic — slow speed and huge listings — they often start using a compiler in order to gain extra speed However the time often comes when the programmer wishes to learn assembly language This is usually because code generated by a compiler is never as efficient as 'real assembly language

Before progressing further it's a good move to examine exactly what assembly language is A computer is based around a particular microprocessor In the case of the BBC micro it is a 6502, but many computers are based on other (usually more exotic) processors, such as the 8088 6088 or the Z80

Each of these microprocessors responds to its own particular set of machine level instructions which make it carry out certain very basic things These operations usually consist of fetch a number from a particular memory location" add these two numbers together' or 'store a number in this memory location"

All these operations are identified by a special number — the operation code or op-code — which depends on the microprocessor in use To program a computer in these numbers you simply fill up memory with the relevant numbers and set the computer up to execute them This is a very tedious way of programming because the numbers themselves bear no relation to the operation being performed This makes them difficult to remember especially in the case of the 8086 where there are billions of different numbers

Rather than expecting programmers to remember these endless sequences of numbers, manufacturers have developed various mnemonics to represent these numbers For example a common operation in assembly language programming is to load a given number into a variable (in assembly language there are only three variables available) In machine code this is represented as *&A9 &XX* where *&XX* is the number to be loaded On the other hand the same instruction in 6502 assembly language is *LDA £XX* In the case of the 6502 the mnemonics are a little odd, but they are very easy to remember because there are so few of them

Before we can start to learn about 6502 assembly language programming we'll have to learn more about the 6502 itself

Internally, the 6502 consists of several registers These registers are similar to the variables that you use in Basic except that they are more limited in range Most 6502 registers are 8 bits wide which means that they can only hold a number between 0 and 255

The registers provided are the accumulator which is often referred to as the *A* register the two index registers which are usually referred to as *X* and *Y*, the program counter register which is called *PC* the stack pointer which is called *SP* and the status register which we shall call *P*, although there is no defined standard for this register

The accumulator is the most important register of the system It is used for all arithmetic and logical operations It is 8 bits wide The index registers are used to access memory but they are often used for passing parameters to subroutines The index registers cannot be used for arithmetic of logical instructions Both index registers are 8 bits wide

The program counter is probably the oddest register It is 16 bits wide, but it cannot be accessed directly by the programmer It is used to keep track of which instruction is being executed

The stack pointer serves exactly the same purpose as those used in Basic programs in the rest of this book The odd thing about this one is that it is only 8 bits Because it is used to access memory, we might expect it to be a full 16 bits wide The stack pointer is always assumed to be between addresses *&100* and *&1FF* so the top 8 bits are not needed

The status register contains 8 bits which reflect various things about the current state of the microprocessor For example one of the bits is always a 1 (or 'set) if the last instruction dealt with a number that was zero — it is only unset if the number was not zero These flags are used for things like testing to see if one number is greater than another

Because there are so few of these registers it is also possible to treat all the memory locations in page zero (the bottom 256 bytes of memory) as 256 extra registers They aren't quite as good as real registers since they are slower to access In addition in the case of the BBC micro many of these registers in page zero are used up by Basic and the operating system In fact the only locations in page zero that are free for us to use are *&50* to *&8F* In theory that should read *&70* to *&8F* but most machines do not use locations *&50* to *&6F*

Most of the 6502 instructions access memory in some way The way in which they access memory varies according to exactly what the instruction does There are 11 basic addressing modes (or ways to access memory)

The most obvious addressing mode is immediate addressing In this mode the data for an instruction follows immediately on from the machine code identifying the instruction In other words this mode means we are loading the accumulator with a number rather than the number found at an indicated address It is similar to the Basic statement *Let A = 23* To indicate that this addressing mode is in use the number is preceded with a £ sign (pronounced hash) Eg *Lda £6* would place the number 6 in the accumulator

On the other hand if you miss out the hash sign you get direct memory addressing This means 'load the accumulator with the contents of the given memory location Using the above example *Lda &* would mean "load the accumulator with the contents of location 6" In Basic, a similar statement would be *Let A = ?8*

Direct addressing comes in two forms — 8 bit addressing and 16 bit addressing The idea is that you can access any location using the 16 bit addressing mode (for example *Lda &3200*) If the address you wish to access is in the first 256 bytes of memory you can omit the most significant byte from the address This makes instructions which access the first 256 bytes of memory faster than the others

The BBC micro assembler automatically decides which of the two kinds of direct addressing should be used, which means that you rarely have to think about the two kinds of instructions However it is sensible to ensure that any data that you may wish to access in memory repeatedly during a program is placed in page zero

The next addressing mode is sometimes call ' implied or inherent In this addressing mode no data is required by the instruction This means that the instruction is written without any memory address indicated in the assembly language It doesn't need any data, because instructions using this mode always imply their own data Examples of this kind of mode are *Clc* which clears the carry flag, *Tax* which transfers the contents of register *A* to register *X*, and the similar *Tay*

Accumulator addressing is similar to implied addressing, except that the data is always assumed to be the accumulator The trouble is that these instructions can often use other addressing modes, so it becomes necessary to include an indication of the addressing mode required The normal way of doing this is to include the letter "*A*" after the mnemonic For example, the instruction *Asl &3200* means "multiply the contents of location &3200 by two", whilst *Asl A* means "multiply the contents of the accumulator by two ■

To be continued next week.

This is an extract from *The BBC Micro Compendium* available from 1 August from Interface Publications 44-46 Earls Court Road London W8

***Open Forum* is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.**

Race

on Spectrum

The object of this game, written for the ZX Spectrum, is to steer your car around the race track avoiding the sides and trying to reach the finishing post, shown as a capital 'F'. This is quite hard to do — I have only managed it a couple of times! If you think it is too hard you can easily change the track by altering lines 60-120.

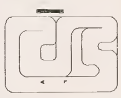
The graphics characters in line 15 are in alphabetical order, ie. the first one is a graphic 'A', the second a graphic 'B', etc. Make sure that the graphics string G$ in line 9010 is typed in in the order shown.

Program notes

3-50	Initialisation
60-120	Draw track
140-250	Main loop
300-399	Crash routine
9000-9270	Graphics setup

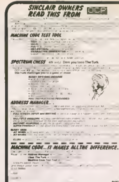
Use key 'M' to steer to the right and key 'N' to steer to the left.

```
  1 REM ***** RACE *****
  2 REM                  © C.COX
  3 GO SUB 9000
  4 LET lvs=3  LET lps=0
  6 LET sgn1=1  LET sgn2=1
  8 CLS   LET pos=1
 10 DIM c$(8,5)
 12 LET x=10  LET y=15  LET xx=
x  LET yy=y
 15 LET c$(1)="◄p0■1   LET c$(2
)="▼■1■1"  LET c$(3)="▲■1p0"  LE
T c$(4)="◄■1p1"  LET c$(5)="►p0p
1"  LET c$(6)="◄p1p1"  LET c$(7)
="▼p1p0"  LET c$(8)="▲p1■1"
 50 BORDER 1  INK 2
 60 PLOT 32,160  DRAW -16,-16,P
I/2  DRAW 0,-129  DRAW 16,-16,PI
/2  DRAW 200,0  DRAW 16,16,PI/2
 DRAW 0,120  DRAW -16,16,PI/2  D
RAW -200,0
 70 PLOT 60,38  DRAW -16,16,-PI
/2  DRAW 0,62  DRAW 16,16,-PI/2
 DRAW 32,0
 80 PLOT 104,160  DRAW 16,-16,-
PI/2  DRAW 16,16,-PI/2  PLOT 120
,144  DRAW 0,-64  DRAW -8,-8,-PI
/2
 90 DRAW -16,0  DRAW -8,8,-PI/2
 DRAW 0,15  DRAW 8,8,-PI/2  DRA
W 16,0  DRAW 8,8,PI/2
100 PLOT 61,38  DRAW 75,0  DRAW
 16,16,PI/2  DRAW 0,64  DRAW 16,
20,-PI/2
110 DRAW 40,0  PLOT 199,138  DR
AW -16,-16,PI/2  DRAW 0,-52  DRA
W 16,-8,PI/2
120 DRAW 8,0  DRAW 0,-24,-PI  D
RAW -64,0  PLOT 240,124  DRAW -1
6,-16,-PI/2  DRAW -16,0  DRAW 0,
-16,PI  DRAW 16,0  DRAW 16,-16,-
PI/2
140 PAPER 7  INK 9  FLASH 0
142 PRINT AT 0,10; BRIGHT 1; IN
VERSE 1;"LAPS  ";lps
144 PRINT AT x,y-3;"."
145 LET st=pos  IF pos=1 THEN P
RINT AT x,y+2;"F"
147 IF pos=5 THEN PRINT AT x,y-
2;"F"
150 PRINT AT xx,yy;" ";AT x,y;c
$(pos,1)
160 IF c$(pos,2)="■" THEN LET s
gn1=-1
170 IF c$(pos,4)="■" THEN LET s
gn2=-1
175 LET xx=x  LET yy=y
180 LET x=x+(sgn1*(VAL c$(pos,3
)))  LET y=y+(sgn2*(VAL c$(pos,5
)))
190 IF ATTR (x,y)=58 THEN GO TO
 300
195 LET sgn1=1  LET sgn2=1
200 IF INKEY$="m" THEN LET pos=
pos+1  IF pos>8 THEN LET pos=1
210 IF INKEY$="n" THEN LET pos=
pos-1  IF pos<1 THEN LET pos=8
220 IF pos=st AND SCREEN$ (x,y)
="F" THEN BEEP .1,10  BEEP 1.5,1
0  BEEP .1,15  BEEP 1.5,15  LET
lps=lps+1  GO TO 142
250 GO TO 150
300 REM xplosion
305 LET lvs=lvs-1
310 PRINT AT xx,yy; FLASH 1; BR
IGHT 1; OVER 1; INK 2; PAPER 6;"
■";AT xx,yy;"-";AT xx,yy;"|"
311 FOR i=1 TO 10  BEEP .1,-10
 BEEP .03,-30  NEXT i
312 PRINT AT xx,yy;" "  INK 0
320 LET x=10  LET y=15  IF RND<
=.7 THEN LET pos=1
326 IF lvs<1 THEN PRINT AT 10,8
; FLASH 1; PAPER 3; INK 6;"G A M
E  O V E R"  GO TO 350
330 IF pos<>1 THEN LET pos=5
335 LET lps=0  GO TO 142
350 FOR i=-5 TO -15 STEP -1  BE
EP .3,i  NEXT i
360 FLASH 1  BRIGHT 1  CLS  PR
INT AT 19,7;"ANOTHER GO ?"
370 IF INKEY$="y" THEN FLASH 0
 BRIGHT 0  CLS  GO TO 4
380 IF INKEY$="n" THEN STOP
399 GO TO 370
9000 RESTORE 9200
9010 LET g$="cgaedfbh"
9020 FOR c=1 TO LEN g$
9030 FOR i=0 TO 7  READ gr  POKE
 USR g$(c)+i,gr  NEXT i  NEXT c
9100 RETURN
9200 DATA 16,56,56,124,124,254,1
98,130
9210 DATA 130,198,254,124,124,56
,56,16
9220 DATA 0,7,30,124,252,124,30,
7
9230 DATA 0,224,120,62,63,62,120
,224
9240 DATA 3,7,15,31,63,127,7,3
9250 DATA 3,7,127,63,31,15,7,3
9260 DATA 0,255,255,126,60,28,12
,4
9270 DATA 0,4,12,28,60,126,255,2
55
```



Race
by C Cox


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Square

on Commodore 64

This is a puzzle game for the 64 which tests your powers of patience and reasoning

Variables

X(25) Used for colour flag
AA Centre of particular square
CC Ascii number of square code
GG Ascii number of square code
XY Ascii number of square code

Program notes

0	Colour setting
800-890	Instructions
3	Initialise array
5	Colour square (black)
400-430	Draw random square
510-530	Draw random square
10-251	Change colour of square
500 530	Change colour of squares
500-602	Are all squares yellow?
605-650	Translate letter of square to Ascii

(Lines 10 to 250 are easily entered if overtyping is used)

```
 POKE53280,7 POKE53281,7
  GOSUB800
3 DIMX(25) FORI=1TO25 X(I)=0 NEXT
4 PRINT"" GOSUB5 GOTO7
5 FORJ=0TO480STEP40 FORK=55507TO55522 POKEJ+K 0
  NEXT NEXT RETURN
7 GOSUB400 GOTO600
10 AA=1277 CC=1 GOSUB500 AA=1280 CC=2 GOSUB500
   AA=1397 CC=6 GOSUB500
11 GOTO600
20 AA=1280 CC=2 GOSUB500 AA=1277 CC=1 GOSUB500
   AA=1283 CC=3 GOSUB500
21 AA=1400 CC=7 GOSUB500 GOTO600
30 AA=1283 CC=3 GOSUB500 AA=1280 CC=2 GOSUB500
   AA=1286 CC=4 GOSUB500
31 AA=1403 CC=8 GOSUB500 GOTO600
40 AA=1286 CC=4 GOSUB500 AA=1283 CC=3 GOSUB500
   AA=1289 CC=5 GOSUB500
41 AA=1406 CC=9 GOSUB500 GOTO600
50 AA=1289 CC=5 GOSUB500 AA=1286 CC=4 GOSUB500
   AA=1409 CC=10 GOSUB500
51 GOTO600
60 AA=1397 CC=6 GOSUB500 AA=1277 CC=1 GOSUB500
   AA=1400 CC=7 GOSUB500
61 AA=1517 CC=11 GOSUB500 GOTO600
70 AA=1400 CC=7 GOSUB500 AA=1280 CC=2 GOSUB500
   AA=1397 CC=6 GOSUB500
71 AA=1403 CC=8 GOSUB500 AA=1520 CC=12 GOSUB500
   GOTO600
80 AA=1403 CC=8 GOSUB500 AA=1283 CC=3 GOSUB500
   AA=1400 CC=7 GOSUB500
81 AA=1406 CC=9 GOSUB500 AA=1523 CC=13 GOSUB500
   GOTO600
90 AA=1406 CC=9 GOSUB500 AA=1286 CC=4 GOSUB500
   AA=1403 CC=8 GOSUB500
91 AA=1409 CC=10 GOSUB500 AA=1526 CC=14 GOSUB500
   GOTO600
100 AA=1409 CC=10 GOSUB500 AA=1289 CC=5 GOSUB500
    AA=1406 CC=9 GOSUB500
101 AA=1529 CC=15 GOSUB500 GOTO600
110 AA=1517 CC=11 GOSUB500 AA=1397 CC=6 GOSUB500
    AA=1520 CC=12 GOSUB500
111 AA=1637 CC=16 GOSUB500 GOTO600
120 AA=1520 CC=12 GOSUB500 AA=1400 CC=7 GOSUB500
    AA=1517 CC=11 GOSUB500
121 AA=1523 CC=13 GOSUB500 AA=1640 CC=17 GOSUB500
    GOTO600
130 AA=1523 CC=13 GOSUB500 AA=1403 CC=8 GOSUB500
    AA=1520 CC=12 GOSUB500
131 AA=1526 CC=14 GOSUB500 AA=1643 CC=18 GOSUB500
    GOTO600
140 AA=1526 CC=14 GOSUB500 AA=1406 CC=9 GOSUB500
    AA=1523 CC=13 GOSUB500
141 AA=1529 CC=15 GOSUB500 AA=1646 CC=19 GOSUB500
    GOTO600
150 AA=1529 CC=15 GOSUB500 AA=1409 CC=10 GOSUB500
    AA=1526 CC=14 GOSUB500
151 AA=1649 CC=20 GOSUB500 GOTO600
160 AA=1637 CC=16 GOSUB500 AA=1517 CC=11 GOSUB500
    AA=1640 CC=17 GOSUB500
161 AA=1757 CC=21 GOSUB500 GOTO600
170 AA=1640 CC=17 GOSUB500 AA=1520 CC=12 GOSUB500
    AA=1637 CC=16 GOSUB500
171 AA=1643 CC=18 GOSUB500 AA=1760 CC=22 GOSUB500
    GOTO600
180 AA=1643 CC=18 GOSUB500 AA=1523 CC=13 GOSUB500
    AA=1640 CC=17 GOSUB500
181 AA=1646 CC=19 GOSUB500 AA=1763 CC=23 GOSUB500
    GOTO600
190 AA=1646 CC=19 GOSUB500 AA=1526 CC=14 GOSUB500
    AA=1643 CC=18 GOSUB500
191 AA=1649 CC=20 GOSUB500 AA=1766 CC=24 GOSUB500
    GOTO600
200 AA=1649 CC=20 GOSUB500 AA=1529 CC=15 GOSUB500
    AA=1646 CC=19 GOSUB500
201 AA=1769 CC=25 GOSUB500 GOTO600
210 AA=1757 CC=21 GOSUB500 AA=1637 CC=16 GOSUB500
    AA=1760 CC=22 GOSUB500
211 GOTO600
220 AA=1760 CC=22 GOSUB500 AA=1640 CC=17 GOSUB500
    AA=1757 CC=21 GOSUB500
221 AA=1763 CC=23 GOSUB500 GOTO600
230 AA=1763 CC=23 GOSUB500 AA=1643 CC=18 GOSUB500
    AA=1760 CC=22 GOSUB500
231 AA=1766 CC=24 GOSUB500 GOTO600
240 AA=1766 CC=24 GOSUB500 AA=1646 CC=19 GOSUB500
    AA=1763 CC=23 GOSUB500
241 AA=1769 CC=25 GOSUB500 GOTO600
250 AA=1769 CC=25 GOSUB500 AA=1649 CC=20 GOSUB500
    AA=1766 CC=24 GOSUB500
251 GOTO600
400 GG=1 FORBB=0TO480STEP120 FOREE=1277TO1289STEP3
    AA=EE+BB
405 IFRND(1)>0.5THENF=32 GOTO410
406 F=102 X(GG)=1
410 POKEAA GG GOSUB510
430 GG=GG+1 NEXT NEXT RETURN
500 IFX(CC)=1THENF=32 X(CC)=0 GOTO510
505 IFX(CC)=0THENF=102 X(CC)=1
510 POKEAA-39,F POKEAA-40,F POKEAA-41,F POKEAA-1,
    F POKEAA+1,F
520 POKEAA+39,F POKEAA+40,F POKEAA+41,F
530 RETURN
600 FORJJ=0TO480STEP120 FORII=1237TO1249STEP3
601 IFPEEK(II+JJ)<>32THEN605
602 NEXT NEXT
603 GOTO700
605 PRINT "PRESS
    DESIRED SQUARE      "
606 INPUTXX$
607 IFASC(XX$)>47ANDASC(XX$)<58THEN1000
610 XX=ASC(XX$)-64 IFXX>18THEN630
620 ONXXGOTO10 20,30 40,50 60,70,80,90 100,110
    120 130,140,150,160 170 180
630 XX=XX-18
640 IFXX>7THEN1000
650 ONXXGOTO190 200,210,220 230,240,250
700 PRINT "YOU HAVE WON!! ANOTHER Y/N)"
    INPUTAN$
710 IF AN$<>"Y"THENPRINT "" END
720 RUN
800 PRINT "S Q U A R E"
    PRINT PRINT
805 PRINT "YOU WILL BE PRESENTED WITH A 5
    BY 5   SQUARE  THE OBJECT",
810 PRINT" IS TO CHANGE THE      COLOUR OF ALL
   SECTIONS FROM BLACK ",
815 PRINT"TO    YELLOW" PRINT
820 PRINT"   DEPRESSING A PARTICULAR KEY WILL
   CHANGE THE COLOUR ",
830 PRINT" OF THAT AND ALL      ORTHOGONALLY
   ADJACENT SECTIONS"
840 PRINT PRINT "PRESS ANY INTEGER TO FINISH
860 PRINT "PRESS 'SPACE  TO START"
870 GETA$ IFA$="" THEN870
880 IFA$=" "THENRETURN
890 GOTO870
1000 PRINT"       DO YOU WISH TO FINISH(Y/N)",
     INPUTWW$
1010 IFWW$="Y"THENPRINT"" END
1015 PRINT""                  " GOTO605
```

Square
by N F Leigh

Pac-man

on Spectrum

This is an implementation of Pac-man on the Spectrum. The object, as ever, is to go around the maze devouring the dots and avoiding the ghost.

There are four power pills (in each of the corners) which give you about 15 seconds to try to eat the ghost four times.

Each time you do this, your score will be incremented by an ever increasing amount. When all 350 dots have been eaten, the screen will clear and the chase will recommence.

Program notes

Lines	
5	*Defined* Functions for score per ghost and random number for ghost movement
10-90	*Data* for udgs and udgs set up
100-260	*Data* for the maze: the graphics are user defined s.s.
270-320	Set up for a machine code noise for eating of ghost (*Ramtop* set to 64999 but can be lowered for 16K Spectrum)
340	Initialisation of screen: do you want instructions? prompt
370	*Defined* Function for colour of Pac-man depending on his power
390	Variable initialisation
400-470	Screen set up
(480-840 Main loop)	
490-530	Check key being pressed and print Pac-man in appropriate colour
560-570	Check that the Pac-man does not go off the side of the maze
580-600	Check what the Pac-man has "landed" upon
605-610	Check if the side tunnel is being used
615	Check to see if the screen has been cleared and if so do the appropriate things and put on a fresh maze
650-740	Move ghost and see if it has caught the Pac-man
750-770	If so: Let lives be decreased by one
780-800	End of one game and start of another
810-840	Ghost munching and m.c sound playing subroutine
850-890	Instructions
900-1030	Play a little tune
8800-8845	Spectral stripes (see a recent *Popular Computing Weekly*)

The Variables

FN q() 1 or 2, *FN* g() score for a particular ghost, a = *Usr* "a", *Fn* a() colour of Pac-man, x$ = "(name of highest scorer so far)", level = no. screens munched, po = power of Pac-man, sc = current score, live = no. lives left, counter = no. dots munched on any screen, ghostx = vertical pos of ghost, ghosty = horizontal pos of ghost, a$ = current direction of Pac-man, high = the best score so far, y = horizontal pos of Pac-man, x = vertical pos of Pac-man, xx = x, yy = y, ghostyy = ghosty, ghostxx = ghostx, l$ = what is under the Pac-man, gm = no. ghost munched since the last power pill meal.

PROGRAM OF THE WEEK

```
1 INVERSE 0
2 LET peel=PEEK 23733: IF peek<130 THEN LET clear=32400
3 IF peel=255 THEN LET clear=65000
5 DEF FN q()=INT (RND*2): DEF FN g()=(10 AND gm=3)+(8 AND gm=2)+(4 AND gm=1)+(2 AND gm=0)
10 DATA 60,126,255,248,248,255,126,60
20 DATA 60,126,255,31,31,255,126,60
30 DATA 60,126,255,255,231,231,102,36
40 DATA 36,102,231,255,255,255,126,60
50 DATA 56,60,36,126,255,255,170,86
60 LET a=PEEK 23675+256*PEEK 23676
70 FOR f=a TO a+39
80 READ b: POKE f,b
90 NEXT f
100 DATA "SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS"
110 DATA "S..............................S"
120 DATA "S...S..S.S..S.S..S.S.S.S..S...S"
130 DATA "S...SSSS.SSSS.S..S.SSSS.SSSS...S"
140 DATA "S..............................S"
150 DATA "S...SSS.S.S.S.S..S.S.S.SSS...S"
155 DATA "S..............................S"
160 DATA "S.SSS.SSS.S.S.S..S.S.S.SSS.SSS.S"
170 DATA "S.S...S.....S.S..S.S.....S...S.S"
180 DATA ".......SS....S..S....SS......."
190 DATA "S.S..........................S.S"
200 DATA "S.SSS..SSSS...S..S...SSSS..SSS.S"
210 DATA "S.......S.....S..S.....S.......S"
220 DATA "S.......S.....S..S.....S.......S"
230 DATA "S...S.S.......S..S.......S.S...S"
240 DATA "S.SSS.SSSS..SSS..SSS..SSSS.SSS.S"
250 DATA "S..............................S"
260 DATA "SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS"
270 CLEAR clear-1
280 RESTORE 320
290 FOR z=clear TO clear+29
300 READ y: POKE z,y
310 NEXT z
320 DATA 6,5,197,33,15,0,17,40,0,229,205,181,3,225,17,16,0,167,237,82,125,254,255,32,237,193,16,238,201,0
330 LET clear=(65000 AND PEEK 23733=255)+(32400 AND PEEK 23733<130)
340 POKE 23658,8: INK 6: PAPER 0: BORDER 0: CLS : GO SUB 8800: PRINT TAB 7; INK 6;"SPECTRUM PAC-MAN",TAB 6;"------------------",AT 7,5; BRIGHT 1; INVERSE 1;"Sam Knowles © 1983": GO SUB 900: PRINT #0;"Do you want instructions (y/n) ?": PAUSE 0: IF INKEY$="y" THEN GO SUB 850
350 FOR f=0 TO 7: POKE USR "s"+f,254: NEXT f
360 POKE 23609,50: POKE 23693,56: POKE 23562,1
370 DEF FN a()=(1 AND po>0)+(6 AND po=0)
375 LET x$="Sam": LET high=5000
380 PRINT AT 20,0;"Today's greatest ";high;" by ";x$: PAUSE 100: PRINT AT 20,0;"                    "
390 LET level=0: LET po=0: LET sc=0: LET liv=3: LET counter=0: LET ghostx=15: LET ghosty=12: LET a$="A"
400 PAPER 0: INK 5: BORDER 0: CLS
420 PRINT AT 0,0;"LIVES ";AT 0,8;"SCORE ";AT 0,21;"HIGH "
430 PRINT AT 0,26;high
440 PRINT AT 21,0;"Screens munched ";level: GO SUB 1030
445 POKE 23658,8
450 RESTORE 100
460 FOR z=2 TO 19: READ z$: PRINT AT z,0;z$: NEXT z
470 FLASH 1: PRINT AT 3,1;"a";AT 18,1;"a";AT 3,30;"a";AT 18,30;"a": FLASH 0: LET y=10: LET x=16
480 PRINT AT 0,6;liv;AT 0,15;sc
485 IF sc>high THEN PRINT AT 0,26;sc;" "
490 IF INKEY$="P" THEN LET a$="A"
500 IF INKEY$="O" THEN LET a$="B"
510 IF INKEY$="Z" THEN LET a$="C"
520 IF INKEY$="I" THEN LET a$="D"
530 PRINT AT y,x; INK FN a();a$: LET xx=x: LET yy=y
540 IF po<>0 THEN LET po=po-1
550 PRINT AT ghosty,ghostx; OVER 1;"E"
560 LET x=x+(a$="A" AND x<31)-(a$="B" AND x>0)
570 LET y=y+(a$="C" AND y<18)-(a$="D" AND y>3)
580 LET l$=SCREEN$ (y,x)
590 IF CODE l$=0 OR (CODE l$>127 AND CODE l$<144) THEN GO TO 660
600 IF l$="+" THEN LET po=po+50: FOR f=0 TO 5: BEEP .005,45-f: NEXT f: LET gm=0
605 IF x=0 AND y=11 AND a$="B" THEN PRINT AT y,x;" ": LET x=31
606 IF x=31 AND y=11 AND a$="A" THEN PRINT AT y,x;" ": LET x=0
610 IF l$="." THEN BEEP .00125,40: LET sc=sc+10+(10*level): LET counter=counter+1
615 IF counter=350 THEN LET counter=0: LET level=level+1: RANDOMIZE USR clear: RANDOMIZE USR clear: CLS : GO TO 420
620 GO SUB 650
630 PRINT AT yy,xx;" "
640 GO TO 480
660 LET x=xx: LET y=yy: GO TO 580
680 LET ghostyy=ghosty: LET ghostxx=ghostx
```

```
 670 IF FN q()+(ghostx<x) THEN L
ET ghostx=ghostx+1
 680 IF FN q()+(ghostx>x) THEN L
ET ghostx=ghostx-1
 690 IF FN q()+(ghosty>y) THEN L
ET ghosty=ghosty-1
 700 IF FN q()+(ghosty<y) THEN L
ET ghosty=ghosty+1
 710 PRINT OVER 1,AT ghostyy,gho
stxx,"E"
 730 IF ghostx=x AND ghosty=y TH
EN GO TO 750
 740 RETURN
 750 IF po<>0 THEN GO TO 810
 760 LET liv=liv-1: FOR f=10 TO
0 STEP -1: BEEP .01,f-10: BEEP .
01,f: BEEP .01,f+10: NEXT f: LET
 y=10: LET x=17: LET ghosty=11:
LET ghostx=15: PAUSE 10: IF liv<
=0 THEN GO TO 780
 770 PRINT AT yy,xx;" ";AT ghost
y,ghostx; OVER 1;"E": GO TO 650
 780 PRINT AT 0,6;"  ";AT 21,0; F
LASH 1;"GAME OVER"; FLASH 0;
                  FLASH 0
FOR f=1 TO 150: NEXT f: CLS : IF
 sc>high THEN LET high=sc: INPUT
 "You have set a new high sco
re ";( FLASH 1;(sc); FLASH 0);
 " What is your name ? "; LINE
x$
 790 PRINT "  "' INK 4; PAPER 0;"T
oday's greatest  ,high''     b
y  "; BRIGHT 1; INVERSE 1;x$
 800 PRINT AT 21,0; INK 4;"Hit a
ny key to run "Pac-Man" ©": PAUS
E 0: CLS : GO TO 300
 810 LET sc=sc+100*FN q()
 815 LET gs=gs+1: IF gs=4 THEN L
ET gs=0: LET po=0
 820 LET ghostx=16: LET ghosty=1
3
 830 RANDOMIZE USR clear
 840 RETURN
 850 INK 8: PAPER 0: BORDER 0: C
LS
 860 PRINT TAB 11; INK 2;"Pac-Ma
n";TAB 10;"--------"
 870 PRINT "   In this version of
the popular arcade game "Pac-Ma
n", you must manoeuvre your "Puc
ker" which is the "A" over all th
e dots. A   ghost, "E" wanders
around the  maze, & watch out f
or him when  you are green, & po
werless. To  gain power, go & ea
t one of the "*", FLASH 1;"*"; FL
ASH 0;"" in the corners of the m
aze."
 875 LET x$= "88"  LET high=5000
 880 PRINT "  Use these keys for
movement    Q -Up     Z -Down
  I -Left      P -Right"
 890 PRINT #0; FLASH 1;"Hit any
key for next Paragraph": PAUSE 0
 900 CLS
 910 PRINT TAB 9; INVERSE 1;"POI
NTS TABLE"
 920 PRINT "     "; INK 1;"E";
INK 0;" ........+ 100 to score
 930 PRINT "    ","  ........+ 10
 to score            (+100*scre
ens munched)"
 935 PRINT "    ", FLASH 1;"*";
FLASH 0;" ........+ 50  to pow
er"
 940 PRINT "    Today's greatest
,high,' by       ",x$
 950 GO SUB 8000: PRINT #0;"Hit
any key to start !!!": PAUSE 0
 960 RESTORE 1010
 970 FOR f=1 TO 26
 980 READ a,b: BEEP a,b
 990 IF INKEY$<>"" THEN RETURN
1000 NEXT f
1010 DATA .1,4,.1,4,.1,0,.1,-3,.
1,4,.1,0,.1,5,.1,5,.1,2,.1,-1,.1
,5,.1,2,.1,4,.1,4,.1,0,.1,-3,.1,
4,.12,0,.12,-5,.12,-5,.15,-3,.1
,-3,.15,-1,.15,-1,.3,0
1020 RETURN
1030 PRINT
1040 FOR f=1 TO level: PRINT INK
 FN e();"A";: NEXT f
1050 RETURN
8000 REM Spectral Stripes
8005 LET p=0
8010 INK 2
8015 LET x=64: LET y=64
8020 FOR f=191 TO 255
8025 PLOT f,0: DRAW x,y
8030 LET x=x-1: LET y=y-1
8035 NEXT f
8040 LET x=50: LET y=50
8045 INVERSE 1
8050 FOR f=205 TO 255
8055 PLOT PAPER 6,f,0: DRAW PAPE
R 6,x,y
8060 LET x=x-1: LET y=y-1
8065 NEXT f: INVERSE 0
8070 INK 4: LET x=38: LET y=38
8075 FOR f=217 TO 255
8080 PLOT f,0: DRAW x,y
8085 LET x=x-1: LET y=y-1
8090 NEXT f
8095 INVERSE 1: LET x=28: LET y=
28
8900 FOR f=229 TO 255
8905 PLOT PAPER 1,f,0: DRAW PAPE
R 1,x,y
8910 LET x=x-1: LET y=y-1
8915 NEXT f: INVERSE 0
8920 INK p: LET x=14: LET y=14
8925 FOR f=241 TO 255
8930 PLOT f,0: DRAW x,y
8935 LET x=x-1: LET y=y-1
8940 NEXT f
8945 RETURN
```

Whenever A,B,C,D,E or S appear in quotes, they are to be taken as UDG's

line 330 should be line 205

Chnge line 350 to 350 FOR f=1 TO 6: POKE USR "s"+f,126: NEXT f: POKE USR "s",0: POKE USR "s"+7,0

Pac-man
by Sam Knowles

Pset

on Dragon 32

These two programs show how the *Pset* command on the Dragon can be used in an interesting way. Fig 1 draws a spiral pattern, it doesn't stop in the middle so just let it run. Fig 2 draws a snowflake design. Each of these programs can be altered to produce impressive patterns. The *Poke* in line(s) 30 may not work on some Dragons and so should be left out.

Fig 1 — Program notes

10-20	Credits
30	Speeds up computer
40	Sets graphics mode, clears screen
50-90	Sets variables
100 110	Plots points
120	Slows computer down
130	Freezes picture

Fig 2 — Program notes

10-20	Credits
30	Speeds up computer
40	Sets graphics mode, clears screen
50-120	Sets variables
130-140	Plots points
150	Enlarges D by 12
160	Repeats plotting 5 times
170	Slows computer down
180	Freezes picture

Fig 1

```
10    REM **SPIRAL**
20    REM **D DEWEN**
30    POKE 65495,0
40    PMODE 4,1:SCREEN 1,1:PCLS
50    Z = 50
60    FOR I = 1 TO 4800 STEP 3
70    Z = Z - 0.1
80    X = 128 + Z*SIN(I/32*3.142)
90    Y = 96 + Z*COS(I/32*3.142)
100   PSET(X,Y,1)
110   NEXT I
120   POKE 65494,0
130   GOTO 130
```

Fig 2

```
10    REM **SNOWFLAKE**
20    REM **D DEWEN**
30    POKE 65495,0
40    PMODE 4,1:SCREEN 1,1:PCLS
50    A = 0:B = 9.426
60    C = 360:D = 20
70    FOR P = 1 TO 5
80    E = (B - A)/C
90    FOR I = A TO B STEP E
100   X = D*COS(I*10)
110   Y = X*SIN(I)
120   Z = X*COS(I)
130   PSET(128 + Y,96 + Z,1)
140   NEXT I
150   D = D + 12
160   NEXT P
170   POKE 65494,0
180   GOTO 180
```

Pset
by D Dewer

Function Repeat

on Vic20

This program runs on the unexpanded Vic20 Auto-repeat is not standard on the Vic, though it can be programmed The only keys which repeat are the cursor controls the space bar and *Inst/Del* key Sometimes it is desirable to have all keys repeat other times it is preferable to have the usual set up

Here is a program which allows switching between these two modes by using the function keys F1 and F7 F1 switches to all-keys repeat F7 returns to normal

The machine-code routine (once poked into memory by the Basic loader) sits in a free area of memory (673 718) and cannot be touched by other Basic programs The routine revectors then interrupt routine to check every 1/60 of a second for F1 or F7 performs the appropriate *Pokes* then returns to the correct interrupt vector

Pressing *Run/Stop* together with *Restore* disables the program SYS 673 enables it again When typing in the program special care should be taken with the *Data* statements and it should be *Saved* before *Running*

```
10 X=673
20 READD
25 IFD=-1THEN50
30 POKEX,D
35 X=X+1
40 GOTO20
50 SYS673
60 NEW
70 DATA120,169,174,141,20,3,169,2,141,21,3,88,96,169,39,205
80 DATA197,0,240,10,169,63,205,197,0
90 DATA240,11,76,191,234,169,128,141,138,2,76,191,234,169
100 DATA0,141,138,2,76,191,234,-1

Ready:
```

Function Repeat
by Tony Dickens

Code Load

on Ace

This is a machine code loading program for the Jupiter Ace computer Although the speed of Forth abolishes the need for machine code in most parts of games programs there are still some routines which require the extra pace

```
: INPUT
 QUERY LINE
;

: D
 DECIMAL
;

: N
 16 BASE C!
;
DEFINER CODE
 CLS ." No. bytes to be
entered ? "
 INPUT CR CR
 ." Hexadecimal or decimal ?
(h/d) "
 INPUT CR 0
 DO
  INPUT C,
 LOOP
 DECIMAL 253 C, 233 C,
 CR CR
DOES>
 CALL
;
```

Code Load
by Simon Cross

Cruising & Blind Alley

£10 to be won

Can you beat the new high score?

Cruising

First there was *Space Invaders*, then there was *Pacman* – now there is *Cruising* This all-action machine code arcade type game will test your powers of co-ordination to the limit Never before has a game asked you to think so quickly or move so fast

Achieving a high score on *Cruising* takes considerable skill and not a little patience

Popular Computing Weekly is offering £10 each month to the player with the highest score on *Cruising* All you have to do to enter this month s competition is send a print-out of your highest score together with your name and address to

Popular Computing Weekly
Cruising
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19 Whitcomb Street
London WC2 7HF

Each month we will publish the name of the winner and the new *Cruising* high score Are you good enough to accept the *Cruising* challenge?

The highest score sent in so far this month is 43552 from Carl Doran of Skidby Mill N Humberside Entries for this month s competition close on July 31

Notes

1) Each entry must consist of a ZX printout and your name and address
2) Closing date for this month s *Cruising* challenge entries is July 31
3) The highest score each month will receive £10
4) High scores cannot be transferred from one month to another
5) The judges decision is final
6) No employees of Sunshine Publications Ltd or their families will be eligible to enter

Blind Alley

Blind Alley is a game of strategy In order to win you must outwit the computer using your craft to fence in and finally destroy the enemy pursuit vehicles But watch out for the solid trail left by your opponents — one touch is fatal!

Each month *Popular Computing Weekly* is giving away £10 to the player with the highest score on *Blind Alley* To enter this month s competition simply send in a copy of your score and the code at the bottom of the score table together with your name and address to

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19 Whitcomb Street
London WC2 7HF

The highest score sent in so far this month is 99855 from Shui Chung Li of Birmingham Entries for this month s competition close on July 31



Alone in charge of a Dangerous Cargo Spacecraft Video alarms reveal Mad Ants have escaped from containers in Hold 1 Guide your robot to eliminate them before they infect other holds Can you do it before Alien Sensitive Walls crush your robot? Act fast — keep cool Four more cargo holds sabotaged Can you manage Crazy Pods Big Bombs Evil Crawler and approaching Raving Robots? How long can you last? What score can you reach?
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Hobbit problems

This week we're going to look at *The Hobbit* — again My letter file is turning into a *Hobbit Help* file — I must get 10 letters about this adventure to every one about other games

First of all a hall of fame Here is a very short list of people who have completed the adventure recently I ll be updating the list at intervals

Steve Thomas
D Millington
James Evans
Andrew Field (sorry Andrew the prize went long ago!)
Jim Clavier
Kevin Maddocks
Pimperton Lowry and Whittington

This last threesome working on it together, finished the adventure in all of 7 days (nothing better to do hey?) but this was beaten by Matthew Taylor, who at the tender age of seven managed *The Hobbit* in six days! Kathy his elder sister wrote to me about his achievement and yes Kathy, I think he probably is the youngest to have solved the game as well as the fastest of any age!

On now to problems The one that seems to hold many people back is how to escape from the Goblin s Dungeon I m going to print the solution but as an added safeguard I ll make a little code Start at the second letter of the solution and read every other letter — you ll have to return to the first letter eventually and repeat the process

NESAAYYTCOATRHHROYRMIENTOHPEENN-SWAIYNGDOOWWETSHTE

That should keep you busy for a while Type in the commands exactly as I have given them to you and it should work — although this program as you are probably aware is notorious for going off on its own illogical way at times!

Having got out of the Goblin s Dungeon your trials are not over! But, have no fear having escaped from the Dungeon you are very close to the Ring one of the main objects of the adventure and one which you ll need to complete the game

M Laurence of Basildon, is unique as far as I know from the letters that I receive in depositing the treasure (he did it in a special way) and then going back for some more fun This consists largely of Goblin-bashing — each Goblin bashed increases your score by 2 5 per cent

And now, a miscellany of questions "How do I get past the pale bulbous eyes? These kill off a lot of Bilbos, and are almost always fatal As there is as far as I know, nothing on the other side of them I wouldn t personally go anywhere near them!

"What are the pitfalls in Beorn's House? Although these are mentioned in the book I have never come across any and no one else as far as I can tell from your letters has encountered any either

The place that is too full to enter is a no-go area I m afraid although it would be nice to think wouldn t it that Melbourne House plans to release a module to allow exploration of that area That could be *The Hobbit Part Two*

The golden key does not as far as I know (and I am but a humble adventurer like the rest of you) actually do anything Dave Bathe however had other ideas, and has sent me an advertisement that he noticed from a philatelic brokers (they sell stamps for investment) for their golden key club Well I don t think *The Hobbit's* golden key is anything to do with stamps!

Finally just a few points that people have raised No, there are not two cassettes The double cassette that Melbourne House refer to in their advertisements for the game simply means that the program is recorded twice on the tape

Many people wonder how they can complete the game without seeing all 30 pictures As we ve seen this week the main objective can be achieved without completing the whole game And in fact many people seem to finish the game with a score of only 40 per cent or so! It is possible to increase your score even after getting rid of the gold

Kathy Taylor also tells me of one or two interesting bugs they ve found apart from the usual ones Try entering *En (Enter) Do* or *Ex (Enter) Do* You ll find that you ve killed your lunch! I know that it is something you may often want to do in real life but it is rather unusual in an adventure!

Finally if any BBC er TRSer or any other machine-er has ploughed through all this I m sorry that you haven t yet got a version for your machine

Speaking of the Beeb next week I ll be looking at a couple of BBC Adventures and tips I ve received for the solution of some of the problems contained in them ■

This series of articles is designed for novice and experienced Adventurers alike Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter So if you have an Adventure you want reviewed or if you are stuck in an Adventure and cannot progress any further write to Tony Bridge Adventure Corner *Popular Computing Weekly* Hobhouse Court 19 Whitcomb Street London WC2 7HF

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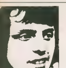
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SOFTWARE ATARI

Cheryl Hays of St Matthews Road, Leigh-on-Sea, writes

Q **I have a friend who has just come back from America, and she says that she read in a computer magazine over there, that Atari software can be used on a Vic20. Unfortunately, she lost the magazine on the way back, so cannot show it to me. I have a Vic20, with Super Expander, and I would like to know if it really is possible to use Atari software, and if so can I get the necessary peripheral over here?**

A I have heard this in connection with a company based in Canada called Electronics 2001. I can see that it might be possible, but I doubt whether Atari would approve. In all honesty I know very little more. I would presume that if the device does catch on in America, then it will make its way over here. But I wonder just how big the market would be, as most of the Atari games now have reasonable Vic look-a-likes which people will have already bought. However, it is an interesting thought, and if it does find its way over here, and can be used on the Commodore 64, then I feel there might well be a worthwhile market.

ERROR ROUTINE

Terry Simmons of Heol-y-Fedwen, Ta Teg, Mid Glamorgan writes

Q **If I set a loop counter (j) so that I can *Input* information into variable array n(k,j), how do I write an error routine that does not allow the user to input a k or a j?**

I have managed to write a routine that will stop me entering numbers that I do not want, but k and j are driving me crazy!

A You do not tell me which computer you are using, nor give me any further details of the program. I presume that you are using something along the lines of

```
FOR j = 1 TO 10
INPUT n(k j)
NEXT j
```

You say that you already have a routine in that will check the value *Input* to see if it is a number you do not want. So you must have an extra line in that reads the *Input* value, before it is assigned to the array. If it is not assigned then you will have to decrement *J*, before *Next J* is called.

If you want to check for j or k then this check for the numbers you do not want is the place to do it. However in most Basics that I can think of 'n' as an array name only can apply to numeric arrays. Could it be that this is the source of your problem, you are trying to enter letters in a solely numeric array? To get over this you will need to use a string array 'n$', with other changes accordingly. When you then read the *Input* to see whether it is a number you want, you just add an extra statement to check whether j or k have been called.

```
INPUT Z$
IF Z$ = "J" or Z$ = "K" THEN
```

the precise syntax will depend on the Basic you are using.

SIMPLE MATHS

Colin Turey of Highgate, Birmingham, writes

Q **I have an Atari 400 and am struggling a bit because there does not seem to be much published for the computer. I am writing a program for my younger brother, to help him with some simple maths, but I am having trouble with the word *Input*.**

I want to put some sums into the computer, and then have him try and enter the correct answer. But when I put the sum in with *Input* the computer either thinks that the number in the sum is the answer, or else does not understand whether it is addition or subtraction. I am sure there must be a simple answer to this!

A *Input* is a command that seems to fool people in various dialects of Basic. In your case what I think you need is *Input* for *both* the numbers used in the sum, and for the operator, and the result. This program will form the base of what I think you are looking for.

```
10 INPUT A
20 INPUT B
30 PRINT "OPERATION ADD(1)
   SUBTRACT (2)
40 INPUT C
50 IF C=1 THEN GOTO 100
60 IF C=2 THEN GOTO 200
70 IF C<1 OR C>2 THEN GOTO
   30
100 LET D = A + B
110 INPUT E
120 IF E = D THEN     (right answer
   routine)
130 IF NOT E = D THEN     (wrong
   answer routine)
```

A and B are the numbers in the sum, which on the Atari will be displayed on the screen, on other computers you might need to add a *Print* statement for each. C is the choice of operation, and it would be no problem to add other options for multiplication and division.

There is then a separate subroutine for each type of operation, these are identified in lines 50 and 60. Line 70 is an error trap, to check for wrong *Input* at line 40.

Line 100 is the addition subroutine, and the operation is defined as addition by line 100. The D becomes the computers copy of the correct answer, and E is your brother's answer. Lines 120 and 130 check your answer E against the computer's answer D and act upon the comparison. The *Then* statement at the end of the line allows you a lot of freedom as what to do next. You might want to keep it simple initially by ending with *Then Print "Correct"* at line 120 and "wrong" at line 130. However, you can develop these to keep a track of right answers, have another go, or print a special display on the screen.

Line 200 would be LET D = A − B which sets the value of D. The next three lines 210 to 230 would be the same as their counterparts 110 to 130. At the moment it would be easier to enter them twice so you can follow through what is happening. However if you want to increase the number of operations available, you will realise that it would be far more efficient to put these repeating lines into a *Gosub Return* routine.

LEARNING PASCAL

Donald McIntyre of Giffnock, Glasgow writes

Q **I have a 48K Spectrum, and have mastered Basic quite well. Now I would like to get into another language, I have tried Pascal and this is the next language I would like to learn. I am sure that I have seen details of Pascal for the Spectrum somewhere. Typically, I cannot find out where, maybe it was just my imagination. Do you know who makes it, and how much does it cost?**

A No, it was not your imagination, although it is quite new, at least as far as actually being able to buy a tape of it. It is produced by Hisoft, and costs £25, that is for an almost complete implementation of the language. If you want to do it the hard way (but cheaper), then Jeremy Ruston's *Learn PASCAL on your Basic Micro* has Spectrum, BBC and Microsoft compilers in the back. They supply a good subset of the language, and if you do not mind entering such a long program then it will be cheaper, plus you get a good book on the subject.

The book is published by Interface, and should be available from John Menzies or W H Smiths. Hisoft are at 60 Hallam Moor, Liden, Swindon, Wiltshire SN3 6LS.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke*, *PCW*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.



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WANTED BBC mode A any condition Redhill (0737) 69337

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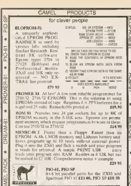
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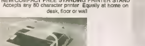
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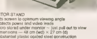
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UNIVERSAL STANDS

NEW RELEASES

PACKAGED



The games pack is an unusual beast — usually loathed by computer journalists and ridiculed by reviewers it is still the staple diet of many a new software house

Games Pack from Sector 7 Software contains seven games for the 48K Oric *Demolition* is *Blitz* — where you have to destroy tall buildings before your plane crashes

Other games include *Noughts and Crosses* and a *3 Dimensional Maze* — all the tried and tested games in fact Doubtless the package will prove popular with those who have just bought their machines because of the recent price drop and are wondering what to do now

Program *Games Pack*
Price *£7*
Micro *Oric 48k*
Supplier *Sector 7 Software*
4 Blagdon Barton Farm
Collaton St Mary
Paignton
S Devon TQ4 7PU

DATA TONE

Music Master is a program for the Lynx that enables you to write music on your computer

A musical stave is displayed on the screen and you select your note by pressing a key Duration of note is selected in a similar way

After you have constructed your melody you can play it back at a variety of speeds and change a note or notes to improve it

Your tune, expressed in terms of Data can be listed and adapted for use in your own programs

Program *Music Master*
Price *£4 95*
Micro *Lynx*
Supplier *Albasoft*
160 Terreglas Avenue
Glasgow G41 4RR

FORTH

There are now a number of versions of Forth available for the Spectrum — Mike Hampson's one man operation has produced three of them

The most sophisticated of his packages is *Spectrum Forth with Floating Point* for the 48K machine This features all the usual Forth functions with a new command *Bleep*, for sophisticated sound effects, and trigometrical functions in radians and degrees

Program *Spectrum Forth with Floating Point*
Price *£14 95*
Micro *Spectrum 48K*
Supplier *Mike Hampson*
7 Hereford Drive
Clitheroe
Lancs BB7 1JP

FILED AWAY

Despite claims to the contrary, it is actually true that a home micro is ideally suited for use as a filing system You really can put all your club records on file and search through them in a couple of seconds — your computer is actually useful!

The problem is of course, that few people can ever understand the instruction manuals that come with these file packages Consequently most people who run clubs etc can be seen running off to buy a notepad and pen after a few days

Having said all that, it's nice to find a file package that comes with a 56-page manual that seems quite easy to understand

Pro-file, from Micro-De-Bug, gives all the usual features of edit delete, find, etc and enables you to design your own file layout

Program *Pro-file*
Price *£9 95*
Micro *Dragon 32*
Supplier *Micro-De Bug Consultancy*
60 Sir John's Road
Selly Park
Birmingham B29 7ER

FOLLOW-UP

Phipps Associates *Magic Mountain* is its follow up to the well received *Knight's Quest* adventure Like that program, *Magic Mountain* is a graphic adventure for the 48K Spectrum

Somewhere within the mountain is hidden the ancient scroll of wisdom — your task is to find it without falling prey to the various traps and dangers set by the ancient sorcerers to protect it

By way of a perk the adventurer may also come across treasures on his travels, as well as less pleasant surprises like poisonous spiders and lizards

The game uses *The Hobbit* technique of splitting the screen to give a graphic window illustrating the scene A hints feature is included, but it will not give up its information easily — you will have to be really stuck

Program *Magic Mountain*
Price *£4 95*
Micro *Spectrum 48K*
Supplier *Phipps Associates*
99 East Street
Epsom
Surrey KT17 1EA

VAPORISED



Quest Microsoftware has its follow-up to *Black Hole* available

In *Violent Universe* you are again confronted with infinite space but this time your only weapons are gas clouds which vaporise the aliens and spaceships attacking you

You pass from level to level by scoring 1 000 points within 40 seconds — the game will work with most of the major joysticks and interfaces on the Spectrum

Program *Violent Universe*
Price *£5 90*
Micro *Spectrum 16 48K*
Supplier *Quest*
119 The Promenade
Cheltenham
Glos

8 GAMES

Michael Orwin Software will be familiar to all ZX81 owners and his *Cassette 5* sounds like good value for money

The cassette contains eight games for the ZX81 most of which are in machine code Games included are *Planetoids*, *Space Rescue* *Breakout* *Draughts* etc

Program *Cassette 5*
Price *£6 30*
Micro *ZX81 16k*
Supplier *Orwin Software*
26 Brownlow Road
London NW10 9QL

LOGICAL

Challenge Games aims to tap an interesting side aspect of adventure games ie detective programs where you must use your powers of deduction to find a criminal

Although analogous to conventional adventure games 'logic' games tend to be stricter and more cerebral and are completely different on each play

The Mansion Murders introduces you to the Montague family An ambitious relative of theirs has been found dead and everybody is suspected of murder From the clues given you must find the guilty party within a certain time limit

The arrangement of suspects weapons motives, etc, is randomly set, so that over 20 000 combinations are possible

Program *The Mansion Murders*
Price *£6 95*
Micro *BBC B*
Supplier *Challenge Games*
64 Ferndale Road
Leytonstone
London E11

JACKPOT



SPECTADRAW 2

The Pools Prediction Program for the ZX Spectrum

Things to do with your Spectrum other than kill aliens number eight win the pools

Well, not exactly win the pools but at least not lose Much *Spectadraw 2* is a pools prediction program which uses a database of over 7 500 matches to predict those teams most likely to draw

Each week you tell the computer what matches are to be played and it will make its predictions based on past form

The author is not claiming that a vast win is likely on this system, but he does suggest that a series of small wins is possible — in any event I suspect that you will have more fun if you are not overly earnest about it

Program *Spectadraw 2*
Price *£12 95*
Micro *Spectrum 48K*
Supplier *Spectadraw*
1 Cowleaze
Chinnor
Oxford OX9 4TD

STAR TREK

The classic computer game *Startrek* is now available on the Jupiter Ace The program which requires 19K, has all the usual trek features of shields, scans phasors, torpedos, etc The task, as ever to rid the galaxy of the Klingon menace

Should you complete your mission successfully you will be awarded a percentage rating depending on your performance

This is one of a number of programs issued recently for the Ace — good to see the software back up improving tremendously for this machine

Program *Startrek*
Price *£5*
Micro *Ace 19K*
Supplier *Ravensoft*
67 Barker Road
Linthorpe
Middlesbrough
Cleveland TS5 5EW

We've put the program in, there shouldn't be any problems, but we've left a telephone number just in case

BABY SITTING Losers PROGRAM

SLALOM!

When the Commodore 64 price cut comes there will be a lot of people with newly acquired machines looking for software

Adamsoft is the UK software distributor for Abacus USA — an American company with a number of products for the 64

Available now is a game called *Skier 64* This gives you a choice of three courses to negotiate *Slalom Giant Slalom* and *Alps* In all three you must use your skill to pass between a number of flags

Should you complete the course you are told that "refreshments and other forms of recreation are left up to your ingenuity

Program *Skier 64*
Price *£6 50*
Micro *Commodore 64*
Supplier *Adamsoft*
18 Norwich Avenue
Rochdale
Lancs OL11 5JZ

UNPLEASANT

FOR ATARI 400/800 COMPUTERS

The English Software company has just released an animated graphic adventure for the Atari 32K

Escape from Perilous requires you to find a wand a sword a pentacle and a cup

The game requires a joystick and is actually more like an arcade game than the conventional adventure As you travel around a maze, looking for the objects you must also avoid various traps and the two monsters Phobos and Deimos, both of whom can do unpleasant things to you

Program *Escape from Perilous*
Price *£14 95*
Micro *Atari 400/800 32K*
Supplier *English Software*
50 Newton Street
Piccadilly
Manchester M1 2EA

DICEY!

Writing programs that only work with add-ons to the basic computer is a dicey business, since you are restricting the number of people to whom you can sell

Nevertheless S&G Software has done just that with its *Speak and Spell* for the Spectrum This program works with a number of the "speech unit" add-ons which enable the computer to speak, in a metallic kind of way

The problem with most speech units is that although using phenomes, it can be made to say almost anything — the system is so intricate it can be weeks before you can get it to say anything recognisable

Speak and Spell aims to simplify this process by enabling you to enter words as a string which it will then translate The markers are not claiming it is 100 per cent accurate, only that the process is greatly simplified

Program *Speak & Spell*
Price *£5 95*
Micro *Spectrum (+speech)*
Supplier *S&G Software*
4 Alpha Street
Darwen
Lancs BB3 2BX

New Releases is designed to let people know what software is coming on to the market If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases Popular Computing Weekly 19 Whitcomb Street London WC2 7HF

Ziggurat

Media-ocre!

"Hi! I'm Brainy and I really rate computers I can tell you why you should convince your dad to invest in a computer or I can end your loading problems.

(*Load Runner* magazine 23 June 1983)

When you consider television's awesome power to educate aren't you thankful it doesn't?

(A cartoon in The *New Yorker* magazine 1965)

The idea of the child is an invention of the seventeenth century In Shakespeare's time there was no such thing The idea of childhood emerged later and until it did the young person had been part of the world of the adult.

Today many children are growing up in a strange environment They live in two worlds — that of the child and that of the adult On the one hand there are children (program writers and such like) who have an earning potential greater than that of most adults On the other hand, they are still children with the mental and emotional equipment of a young person

There is certainly therefore a market for objects which pander to the child, and make gestures towards the adult in the child *Load Runner* the new computer comic appears to be an offering in this direction — though I'm not sure quite how successful it is But then I used to read *Wizard*

If you ask older people what it is that worries them about using computers they often answer that it is the fear of appearing a fool in front of children — who can always use micros so easily

Computing is fun, and that young people can make a comfortable income from programming is not to be deprecated but — as ever — where is our sense of proportion?

In the early 1960s there was a similar boom in youth and a similar chance for those with a certain talent (or lack of talent) — some like the Rolling Stones are still with us As now there was the same adulation of the precocious young Fashions change and boredom ensues

The myths are all around us particularly in the computing media We are messaged by the media into believing that the opportunity for a certain few to leave school at 16 and be millionaires at 16½ is really open to all

Talking to one young person I commented that I enjoyed using the BBC computer because of the machine's power His reply was that writing for the BBC computer was not 'financially viable' which was why he wrote programs (and quite good ones at that) for the Spectrum

Another young man I know (a 16-year-old youth) has just given up his A-level course to work for a computer shpo — he is still continuing to take A-level Computer Studies by day release When he was explaining about his new career he said that he guessed I would think him silly I did

I think he was silly on two main counts one he had effectively given up on education and two the part of education that he had continued was Computer Studies — less useful in my view than Physics or even Latin!

Both these young men have been massaged by the media into believing a narrow minded almber authoritarian scenario As Geoffrey Sampson writes (in *Liberty and Language* 1979) In an authoritarian society in which the allocation of resources is planned to yield maximum production original thought will eventually fade away as universities and related institutions are starved of money or required to shift the balance of their activities away from pure research and towards the teaching of (supposedly) useful established knowledge

Computing should not be pretentious and I actually agree with the sentiment of the *New Yorker* cartoon But fun is one thing and triviality is another And the media seems only able to trivialise computing rather than having fun with computing We get the media we deserve! Fun fun, fun ■

Boris Allan

Puzzle

Tsk, tsk, tut, tut!

Puzzle No 65

TUT
TSK
÷ B
× Z
= TSK TUT

Think of a six figure number Go on Divide it by seven to get the first answer Multiply this first answer by six to get the second answer Surprise! Both answers contain the same six numbers arranged differently The first three numbers and the last three numbers of the first answer have to be transposed to form the second answer What is the question? Find the original six-figure number

Solution to Puzzle No 60

Between them the first two batsmen scored at least 300 runs So we are looking for a total score greater than 300 that is a perfect number — that is the number is the sum of its divisors The first four such numbers are 6 28 496 and 8128

In the program lines 10 to 60 test each number from 300 for this property Then lines 70 to 90 find its divisors print them and count them 10 LET N = 301 20 LET T = 0 30 FOR I=INT(N/2) TO 1 STEP -1 40 IF N/I=INT(N/I) THEN LET T=T+I 50 NEXT I 60 IF T=N THEN PRINT T 70 GOTO 100 80 LET N=N+1 90 GOTO 20 100 FOR I=INT(T/2) TO 1 STEP-1 110 IF T/I=INT(T/I) THEN PRINT I 120 LET B=B+1 130 NEXT I 140 PRINT B BATTED

The total score was 496 achieved by 9 players who scored 248 124 62 31 16 8 4 2 and 1.

Winner of Puzzle No 60

The winner is A O Miller Downs Road Instead Rise, Gravesend Kent who receives £10

Top 10

Vic20

1	(1)	Arcadia	(Imagine)
2	(5)	Cosmiads	(Bug-Byte)
3	(3)	Wacky Waiters	(Imagine)
4	(4)	Panic	(Bug-Byte)
5	(2)	Asteroids	(Bug-Byte)
6	(—)	Race	(Commodore)
7	(8)	Amok	(Audiogenic)
8	(—)	Blitz	(Commodore)
9	(9)	Alien Blitz	(Audiogenic)
10	(7)	Kaktus	(Audiogenic)

(Figures compiled by Boots & Co London)

Spectrum

1	(1)	Penetrator	(Melbourne House)*
2	(3)	Jet Pac	(Ultimate)
3	(2)	Flight Simulation	(Psion)*
4	(5)	The House	(Melbourne House)
5	(4)	Transylvanian Tower	(Richard Shepherd)
6	(6)	3D Tanx	(DK 'Tronics)*
7	(8)	Horace Goes Skiing	(Psion/Melbourne House)
8	(7)	Ah Diddums	(Imagine)
9	(—)	Starship Enterprise	(Silversoft)
10	(—)	Test Match	(Computer Rentals)

*Requires 48K.
(Figures compiled by WH Smith & Bine Ltd)

Atari

1	(—)	Triad	(Adventure International)§
2	(2)	Zaxxon	(Datasoft)†
3	(1)	Miner 2049er	(Big Five)*
4	(—)	The Search	(CS)
5	(—)	Choplifter	(Broderbund)†§
6	(6)	Mountain King	(CBS)*
7	(4)	Repton	(Sirius)†
8	(6)	Helical Ace	(Micropress)†
9	(—)	The Pharoah's Curse	(Synapse)†*
10	(3)	Battle of Sisyphus	(Adventure International)§

Cartridge †32K cassette *32K disc. §48K disc.
(Figures compiled by Micro Management Ipswich 0473 59181)

Dragon 32

1	(1)	The King	(Microdeal)
2	(3)	Space War	(Microdeal)
3	(2)	Talking Android Attack	(Microdeal)
4	(8)	Planet Invasion	(Microdeal)
5	(4)	Night Flight	(Salamander)
6	(7)	Katterpillar Attack	(Microdeal)
7	(6)	Dragon Trek	(Salamander)
8	(—)	Madness and the Minotaur	(Dragon Data)
9	(—)	Chess	(Dragon Data)*
10	(5)	Dragon Trek	(Wintersoft)

*Cartridge
(Figures compiled by Boots & Co London)

BBC

1	(—)	Great Boots Limited	(Simon W Hessel)
2	(2)	Rouse Raid	(Acornsoft)
3	(1)	Killer Gorilla	(Program Power)
4	(—)	Snapper	(Acornsoft)
5	(—)	Monsters	(Acornsoft)
6	(—)	Wordwise	(Computer Concepts)†
7	(—)	Chess	(Program Power)
8	(—)	Creative Graphics	(Acornsoft)
9	(—)	Beeb Calc	(Computer Concepts)†
10	(—)	Guide to Relation	(Acornsoft)

All Model B only †Rom
(Figures compiled by Micro Management Ipswich 0473 59181)

ZX81

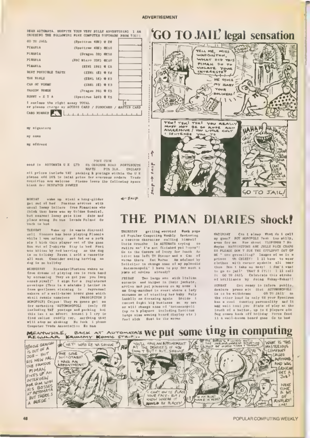
1	(1)	Flight Simulation	(Psion)
2	(2)	Football Manager	(Addictive Games)
3	(3)	Fantasy Games	(Psion)
4	(5)	Space Raiders	(Psion)
5	(6)	Chess	(Psion)
6	(4)	1K Games	(Artic)†
7	(5)	Defender	(Quicksilva)
8	(—)	1K Chess	(Artic)†
9	(—)	Planet Of Death	(Artic)
10	(8)	QS Scramble	(Quicksilva)

*All 16K except where shown
†Runs in 1K
(Figures compiled by Boots & Co, London)

Books

1	(6)	Vic Programmer's Reference Guide *Commodore*	(Commodore)
2	(—)	Basic Programming on the BBC Micro *Cryer*	(Prentice-Hall)
3	(1)	Structured Programming with BBC Basic *Atherton*	(Horwood)
4	(4)	Commodore 64 Programmer's Reference Guide *Commodore*	(Commodore)
5	(8)	Forth on the BBC Microcomputer *De Grandis-Harrison*	(Acornsoft)
6	(10)	Assembly Language Programming for the BBC Micro *Birnbaum*	(Macmillan)
7	(7)	Z80 Assembly Language Sub-routines *Leventhal*	(Osborne)
8	(—)	Enter the Dragon *Carter*	(Melbourne House)
9	(—)	6502 Machine Code for Beginners *Stephenson*	(Newnes)
10	(—)	Spectrum Hardware Manual *Dickens*	(Melbourne House)

(Figures compiled by Watford Technical Books Watford 0923 23324)
(Last week's position in brackets)


DEAR AUTOMATA. DESPITE YOUR VERY SILLY ADVERTISING I AM ORDERING THE FOLLOWING FINE COMPUTER SOFTWARE FROM YOU!!
GO TO JAIL (Spectrum 48K) @ £6
PIMANIA (Spectrum 48K) @£10
PIMANIA (Dragon 32) @£10
PIMANIA (BBC Micro 32K) @£10
PIMANIA (ZX81 16K) @ £5
BEST POSSIBLE TASTE (ZX81 1K) @ £3
THE BIBLE (ZX81 1K) @ £3
CAN OF WORMS (ZX81 1K) @ £3
DRAGON BOMBS (Dragon 32) @ £5
BUNNY + E T A (Spectrum 16K) @ £5
I enclose the right money TOTAL £
or please charge my ACCESS CARD / EUROCARD / MASTER CARD
CARD NUMBER
my signature
my name
my address
POST CODE
send to AUTOMATA U K LTD 65 OSBORNE ROAD PORTSMOUTH HANTS PO5 3LR ENGLAND
all prices include VAT packing & postage within the U K please add 10% to total price for overseas orders Trade enquiries are welcome Please leave the following space blank for DESPATCH NUMBER
snip → snip →
← snip
'GO TO JAIL' legal sensation
TELL ME, MISS WADDINGTON, WHAT DID THIS PIMAN DO TO VIOLATE YOUR INTERESTS?
GASP!
HE STOLE MY BABY YOUR HOLINESS!
TSK! TSK! TSK! YOU REALLY MUST NOT BE SO RUDE AND AGGRESSIVE! YOU LITTLE CULT I SENTENCE YOU TO
HAHAH HAHAHA
GASP
CACKLE
GO TO JAIL!
THE PIMAN DIARIES shock!
MONDAY wake up steal a hang-glider get out of bed Postman arrives with usual loony letters from Pimaniacs who think they have won my Golden Sundial, but nearest loony gets time date and place wrong Go hue invade Poland Go back to bed
TUESDAY Wake up in waste disposal unit Groucho has been playing Pimania while I was asleep and fed me a pork pie I kick this player out of the game Run out of T-shirts Stay in bed Feel bad bitten by red herring as the dog is on holiday Haven t sold a cassette all week Consider eating herring as dog is on holiday
WEDNESDAY Nissanler!Postman wakes me from dreams of playing sax in rock band by screaming They ve got you you long nosed pinoll!" I sign for a registered envelope (This is a mistake) Letter is from gentlemen claiming to represent makers of a well-known board game which shall remain nameless (WADDINGTON S MONOPOLY) Cripes! They re gonna get me for marketing AUTOMONOPOLI (only £8 including VAT postage and packing but this isn t an advert honest) I try to find valium cuddly toy, anything that will stop me shaking No luck I phone Computer Trade Association No hue
THURSDAY getting worried Back page of Popular Computing Weekly featuring a cartoon character calling himself Uncle Groucho Is AUTOMATA trying to retire me? I'm not finished yet boyos!! Go to the Cavern of Ivory for lunch An idiot has left TV Dinner and a Can of Worms there Eat Worms Am advised by Solicitor to change name of my splendid "Automonopoli" I have to pay for such a piece of advice already?
FRIDAY Two large men with Italian accents and bulges in their jackets, arrive and put pressure on my nose I am frog-marched to court where a lady accuses me of stealing her baby Help Luckily am dreaming again Suicide I cannot fight big business me my new or will change name of "Automonopoli (up to 5 players including Spectrum large size moving board display etc) Feel sick Must be the worms
SATURDAY Can t sleep What do I call my game? NOT MONOPOLY ?eah too silly, even for me How about YLOPONOM ? No Maybe WADDINGTONS ARE JOLLY NICE CHAPS SO PLEASE DON T SUE THE EFFLUENT OUT OF ME " too grovelling? Images of me in a prison Oh CRIKEY! I ll have to wear clothes with cursor symbols all over them Now I take me easy! I don t want to go to jail! THAT S IT!!! I ll call it GO TO JAIL Celebrate this stroke of brilliance by doing Hokey-Kokey!!
SUNDAY Get ready to inform public, dealers press etc that AUTOMONOPOLI is to be withdrawn GO TO JAIL on the other hand is only £6 your Spectrum has a cool cunning personality and it will well beat you State of play at the touch of a button, up to 6 players etc Dog comes back off holiday Force feed it a well-known board game Go to bed
MEANWHILE, BACK AT AUTOMATA'S REGULAR 'KRUMMY KOMIC STRIP'..
we put some ting in computing
UNCLE GROUCHO IS OUT OF A JOB - BUT HIS NEW PAL, THE FAMOUS PIMAN, FIXES UP AN INTERVIEW FOR HIM WITH HIS BOSSES AT AUTOMATA BUT THERE'S A QUEUE'
HEY! WHO'RE YA SHOVIN'?
ONE SIDE SUCCOTASH! I HAVE AN APPOINTMENT!
AU
YOU'LL HAVE AN APPOINTMENT AT THE DENTIST'S IF YOU DON'T BUTT OUT, SHRIMP!
I CAN'T QUITE PLACE YOUR FACE - BUT I KNOW WHERE IT SHOULD BE PLACED!
HONK HONK!
WHAT IS THIS MYSTERIOUS COMPANY CALLED AUTOMATA, AND WILL GROUCHO GET A JOB?
NEXT TIME A BIT OF RIVALRY!